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FLIGHT

AIRCRAFT, SPACECRAFT, MISSILES

Official Organ of the Royal Aero Club First Aeronautical Weekly in the World Founded 1909

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Present Indicative

FIRST and top. Attainment of these distinctions is one of man's most compulsive stimulants; and should performance fall a little short, then historical recognition can sometimes be secured by a little judicious cheating or amnesia. Thus the latest, and by far the most exciting, book of aeronautical history* is especially remarkable for the neatness and thoroughness with which it demolishes long-standing "claims," many of which had become dogma.

But it is one thing to play little games with history and quite another to bungle and contort the making of history. Consider the principle of variable geometry, the re-arranging of an aeroplane's wing-form in the manner of the Barnes Wallis Swallow. A claim that Dr B. N. Wallis of Vickers invented the principle would hardly be supportable, though to name him as its greatest proponent would be to give him his place in history. But it now appears that it will be the Americans, with the forthcoming Boeing fighter/bomber, who will go on record for the first realization and exploitation of "v.g."

The issue following that in which we announced the Boeing project gave details of Northrop's plans for using boundary-layer suction to reduce drag, whereas we in this country had come to regard the rightful fosterparents of b.l.c. as Handley Page Ltd, of Cricklewood. And thirdly we have spokesmen for Short Brothers, constructors of the first flat-rising jet-lift aircraft in history, expressing concern that others than ourselves—who put the principle to the test—will be the first to put it to work. Bob Hotz, who edits *Aviation Week* and knows his business, told us at Farnborough that Britain must stay right with jet-lift and not fritter and fiddle away her pioneering efforts. Such matters as these involve great questions and great sums of money. Above all, they demand great courage. How will Britain show up in future editions of Mr Gibbs-Smith's book?

Clouded Horizon

TRY as it may, light aviation in Great Britain cannot properly get under way without Government encouragement. Some sort of overall policy is needed if there are ever again to be a light-aircraft manufacturing industry and a home market for some of its products. Business-aviation enterprise, as Mr Peter Masefield recalls (see page 525) has in little more than a year sold in this country American light aircraft to the value of £1 million. But notwithstanding the renewed interest in private flying that these sales have engendered it seems doubtful if they have even been officially noticed.

In this issue is advanced a plea (pages 540 and 541) that instrument-flight safety be brought within easier reach of the business and private pilot. Also reported is the threatened closure of yet another airfield in the vicinity of London. These items typify the frustrations with which private flying is faced. The problems are not insuperable but the Minister's guiding hand is needed if they are to be solved in more than piecemeal fashion. If the future of general aviation in this country were a little less cloudy, and tenure of airfields a little more secure, private enterprise would be more willing to aid in their development. Likewise a reassessment of the air traffic control system from the standpoint of its responsibilities to the private pilot would hasten the development of equipment and stimulate pilot training. Yet absent still is an effective executive body before which such matters can be voiced and by whom ideas can be translated into action.

* *"The Aeroplane: An Historical Survey," by Charles H. Gibbs-Smith. Her Majesty's Stationery Office; £1 15s net.*

FROM ALL QUARTERS

de Havilland Integration

UNDER a decision to run the de Havilland Aircraft Co and D.H. Propellers as a single entity, arrangements are being made to combine their activities under a joint board in a single company to be called the de Havilland Aircraft Co. D.H. Holdings will cease to function. Details of these arrangements will be announced in due course.

Gliding Aerobatic Champions

THIS year's national aerobatic gliding champion is Flt Lt Douglas Bridson, a flying instructor at the RAF College, Cranwell. He won the annual contest at the London Gliding Club site on Dunstable Downs, Beds, last Sunday in his privately owned Skylark II. Second among the fifteen competitors was Dan Smith, who is CFI and vice-chairman of the London Gliding Club, flying a Swallow over what to him is familiar terrain. Mr Smith won the competition in 1957. Third was another RAF pilot (though again not an official RAF entry), M/Plt H. E. K. Poole of RAF Bicester, who was participating for the first time and has been gliding for less than a year.

Weather conditions were good for aerobatics and as there were no compulsory manœuvres, marks were awarded for the scope, accuracy, artistry, positioning and originality of each pilot's display. Flt Lt Bridson won four prizes: the Jack Hanks Trophy, £25 Emmott prize and a tankard for top marks in the aerobatic contest; and an additional award for a spot landing. Prizes were presented by Mr Geoffrey Rippon, Parliamentary Secretary to the MoA. Competition judges were Maj Oliver Stewart (chairman), Capt H. S. Broad, Jeffrey Quill, Sqn Ldr C. K. Turner Hughes, G. A. V. Tyson, Air Cdre A. H. Wheeler and A. W. ("Bill") Bedford, with Wg Cdr H. P. Powell acting as secretary to the judges.

GLIDING AEROBATIC CHAMPION: Flt Lt Douglas Bridson, a flying instructor at the RAF College, Cranwell, receiving the Jack Hanks Trophy—premier award in the National Glider Aerobatic Contest—from Mr Geoffrey Rippon, MP, Parliamentary Secretary to the MoA, at Dunstable last Sunday (news-item, this page)

Gp Capt F. R. Carey, CBE, DFC, AFC, DFM, RAF (ret), who has been appointed sales representative in Australia of the aero-engine division of Rolls-Royce Ltd. Air Adviser to the UK High Commissioner in Australia from 1958 to 1960, he retired from the RAF in June this year. In addition to his British decorations, he holds the American Silver Star

The Student and the College

REFERRING to our report last week of the opening of the College of Air Training, Mr G. H. Miles, a director of F. G. Miles Ltd, constructors of the Student jet trainer, writes:—

"Under the heading 'The College Opens' in your issue of September 23 you report: 'The choice of an American twin was practically inevitable, Hamble being too small for all-through jet training to be contemplated. The Student was evaluated and thought "delightful" but the substantial margins required for successful pupil training could not be guaranteed on a grass field of Hamble's size . . .'

"In fact, we were not asked to guarantee any margins, although we would be quite willing to do so. It is significant that virtually all test and demonstration flying on the Student has been carried out from a grass field which is smaller than Hamble, although the engine is the Marboré II of 880lb s.t. against the 1,060lb thrust now available from the Marboré VI. We would be prepared to guarantee zero wind take-off and landing ground runs of 450yd for the single-engined aircraft on a grass surface. Over a 50ft obstacle, we would guarantee 900yd. I believe the maximum run available at Hamble is 1,450yd."

Another 180lb thrust must, of course, bring about a significant improvement in the Student's take-off performance although a Marboré VI has yet to be installed and the aircraft certificated with this engine. What is a "substantial" margin? The College reason that *ab initio* pupils landing at Hamble must be allowed wide latitude on correct approach paths and approach speeds, and only one direction has 1,450yd available. Landing distances in other directions are: NE/SW, 830yd; E/W, 800yd; and SE/NW, 1,200yd. Types selected for training are the Chipmunk and Apache G. Take-off distance for the latter is 396yd and landing roll 250yd.

These facts notwithstanding, Mr Miles's letter is a reminder of the Student's truly outstanding qualities—and not in respect of performance alone.

Mr Ward Visits Westlands

THE Secretary of State for Air, Mr George Ward, flew to Yeovil last Friday for discussions with the chairman of Westland Aircraft Ltd, Mr Eric Mensforth, and other members of the board. He was given a flight in the Belvedere and watched demonstrations by the Belvedere, Wessex and P.531. Mr Ward also toured the high-altitude laboratory of Normalair Ltd.

EYES FRONT (or more so than in Roger Bacon's "Straight and Level" picture last week) by the pilots of Treble One Squadron. With them are guests from Hawker, the occasion being the presentation of Hunter models by Mr George Anderson, the firm's public-relations manager

SALES TALK: Discussing Shorts' new Beechcraft Travel Air on its delivery recently to Queen's Island are (l. to r.) Mr John Coleman (commercial manager, light aircraft division), Mr Frank Robertson (chief engineer, light aircraft division) and Mr Richard Spencer (Beech sales)

The Future of Light Aviation

"SINCE the ban on the import of foreign light aircraft into this country was lifted in 1959 the extent of the expanding market is shown by the sale of more than £1 million worth of small American aircraft inside the UK. We are, quite clearly, on the eve of a new upsurge in executive and sporting flying—the ripples from which can spread wide."

These remarks by Mr Peter Masefield prefaced a Royal Aero Club policy statement on British "general aviation" in an editorial in the September issue of the *Royal Aero Club Gazette*. The Club believes, he writes, that real progress could at last be made in a new atmosphere of enthusiasm for light aviation were the Government to draw up a cogent policy based on six fundamental points. These are:—

(1) A "general aviation branch" to be set up in the Ministry, charged with the encouragement and support of light aviation and gliding; (2) a policy of "free air space below 1,500ft"—except in the immediate vicinity of large airports—to be adopted as a national air traffic control philosophy; (3) Government encouragement of suitable aerodromes for general aviation throughout the country and particularly in the London and home counties areas, where 20 such airfields have been closed since the war. (The Croydon issue should, even now, be re-examined); (4) provision of adequate customs amenities and hangarage for general aviation at all State-owned airports; (5) rebates in fuel tax to be maintained and extended; (6) a National Flying Trust to be set up to replace the former "Kemsley Trust."

"Mr Peter Thorneycroft," the editorial ends, "stands as the one person today who can direct real encouragement in this country. It is a national opportunity and we believe that Mr Thorneycroft . . . is the sort of man who can at last see that British general aviation enjoys that 'favourable official climate' which is all it needs to grow and flourish."

English Electric Bradford Posts

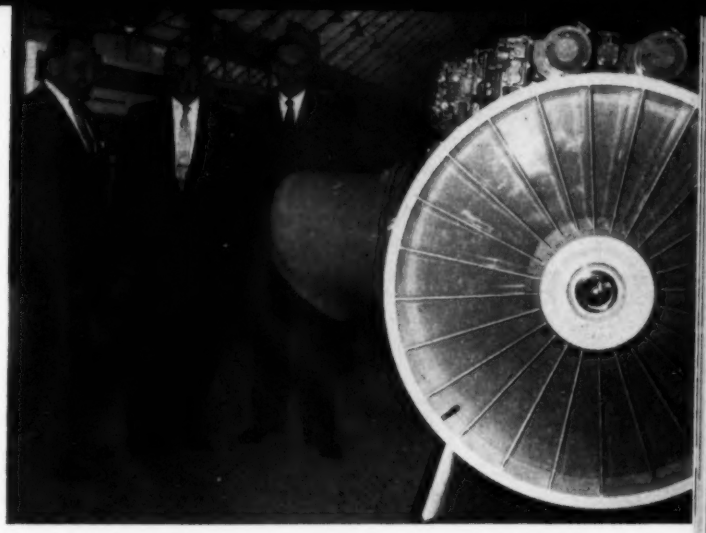
TWO new appointments in the English Electric Co aircraft equipment division at Bradford, Yorks, are those of Mr J. C. King as manager and Mr J. C. Rivett as deputy manager. Mr King, who will be responsible for the engineering, servicing and commercial activities of the division, has been assistant director of engineering

Mr John C. King

Mr J. C. Rivett

with English Electric in London since 1957. Mr Rivett has been chief engineer of the company's aircraft equipment division since 1955.

These appointments follow the recently announced transfer (*Flight*, September 23) of Mr P. J. Daglish, formerly manager of the division, to D. Napier & Son Ltd as a special executive.



***PRESIDENTIAL APPRAISAL** by Sir George Dowty (centre), president of the SBAC and chairman of the Dowty Group, of the Dowty fuel system in the Bristol Siddeley BS.53 powerplant on show at Farnborough. With him are the Bristol Siddeley managing director, Sir Arnold Hall (right), and Mr A. E. Eustace of the company's sales department*

IN BRIEF

A record speed of 1,130.22 m.p.h. (1,820km/hr) over a 1,000km (621 miles) closed circuit has been claimed for the Dassault Mirage IV, achieved on September 19 by René Bigan, Dassault chief test pilot. The existing record, 700.47 m.p.h. (1,126km/hr), was set up by Col E. H. Taylor on April 8 last year in a McDonnell Voodoo.

The MoA have announced that Mr R. H. Weir, CB, at present Director-General of Engine Research and Development, has been appointed Director of the National Gas Turbine Establishment at Pyestock in succession to Mr H. Constant, CB, CBE, FRS.

Mr R. P. Dickinson, of A and AEE, Boscombe Down, will be among those reading papers to the Flight Mechanics Panel of AGARD at their meeting in Istanbul early next month. His subject will be *The Testing of Aircraft Weapon Systems.*

The National Aeronautical Collection at the Science Museum, South Kensington, London SW7, is to be closed to visitors from Monday, October 3. This is to allow re-organization prior to the collection being installed next year in the museum's new centre block.

Under the title *Aviation Electronics and its Industrial Applications*, a British Institution of Radio Engineers' Convention is being held in Bristol next Friday and Saturday (October 7 and 8) at the College of Science and Technology, Ashley Down Road, Bristol 7. Registration forms may be obtained from W. C. Henshaw, MSC, ASSOC BRIT IRE, c/o School of Management Studies, Unity Street, Bristol 1.

Mr Guy T. Smith, BSC(Eng), AFRAES, formerly regional sales manager for Bristol Siddeley Engines Ltd, has been appointed sales manager of the company's Aero-Engine Division and in this capacity will be responsible for the sales promotion of Bristol aero engines throughout the world. He succeeds Air Cdre H. M. Pearson, who has relinquished the sales managership to take up a new appointment which involves extensive travelling overseas on prestige and sales promotion. Both Mr Smith and Air Cdre Pearson will be directly responsible to Mr W. H. Rees, the company's general sales manager.

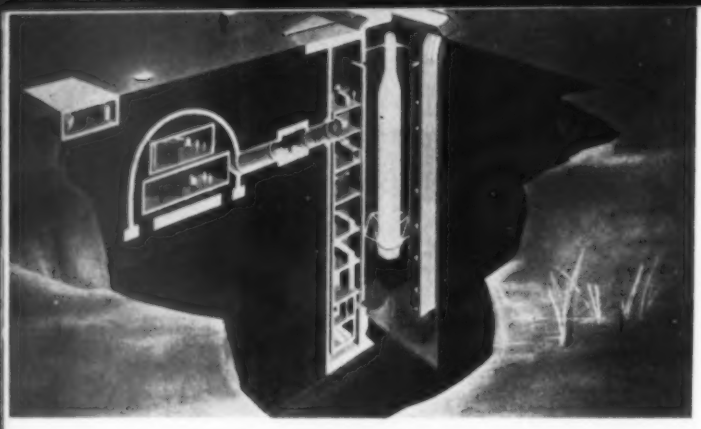
The fifth annual Test Pilots' Forum, organized by the London Society of Air-Britain, will be held on October 5 at 7 p.m. at Caxton Hall, London, SW1 (near St James's Park Underground station). Questionmaster will be H. G. Hazelden, chief test pilot of Handley Page and the panel will include four other well-known test pilots. The Forum will be preceded by two colour films: *Magic of a Name* (Rolls-Royce) and *Orpheus Lightweight Turbojet* (Bristol Siddeley).

***QUEEN'S ISLAND EXECUTIVE:** The Travel Air delivered recently to Short Brothers (see picture opposite), who are now distributors for Beechcraft aeroplanes in the United Kingdom*

Missiles and Spaceflight

WEST COAST WEEK

BY KENNETH OWEN



Artist's cut-away conception of a typical Titan underground-silo launching site (see col 1 below)

WE stood at the side of the massive flame-bucket built into the raised concrete launch-pad. The tall, delicate trestle of a gantry had been pulled away towards the down-sloping ramp. Above us was poised the missile, glistening in the hard California sun and wearing its gaudy Strategic Air Command bellyband like a Sam Browne belt. Inside the squat, innocuous-looking nosecone was a nuclear warhead. The missile was ready to go, at what might have been 15 minutes' notice.

Our hosts at Vandenberg Air Force Base, California, were the 576th Strategic Missile Squadron, a unit of Strategic Air Command's First Missile Division. The launch pad was one of six operational Atlas pads at Vandenberg: there are an additional six Atlas pads now operational with 564 Sqn at Francis E. Warren AFB, Cheyenne, Wyoming.

The First Missile Division at Vandenberg has a threefold task: to maintain operational Atlas ICBMs on alert status, to train the crews for all US ICBM squadrons, and to support the development of polar-orbiting satellites. To prepare for the introduction of Titan and Minuteman, the 395th and 394th Missile Squadrons respectively have been formed at Vandenberg. As with No 576, these two additional squadrons will have both operational and training responsibilities. By 1962 the Division is scheduled to have a total of 25 launch emplacements available from which to fire ICBMs in anger.

The vertical, above-ground type of Atlas pad, such as the one we were inspecting, is admitted to be vulnerable and not particularly suitable as an operational system. The only reason such Cape-Canaveral-type gantries, tailored to the needs of R and D firings, were in fact adopted, was that operational status was to be achieved at the earliest possible date. This date was September 9, 1959, and the firing was made from this particular site.

On the bleak Vandenberg skyline three of these sites were visible: three gantries, and three Atlas missiles which were apparently at readiness for firing. The trio is controlled from one blockhouse, which means that, with the current Atlas Ds employing radio-inertial guidance, there must be a six-minute delay between firing the first and second missiles, and a further six-minute delay between second and third. The six-minute period is the time during which the missile must be guided from the ground.

Normal reaction time for Atlas is 15 min, although it is possible to continue the countdown until T minus 8 (8 min before firing) and to hold at that stage "indefinitely"—which presumably means for a long time.

A second trio of Atlas ICBMs at Vandenberg is stored horizontally in special pads and raised to the vertical position only for actual firing or simulated countdown. Again the individual missiles are controlled from one blockhouse. The developed versions of these horizontal installations will be "semi-hard," i.e. able to withstand approximately 25 lb/sq in. The forthcoming E Model Atlases at the various operational bases in the USA will use either pads of this type, or hole-in-the-ground vertical silos hardened to some 100 lb/sq in. Missiles in this latter type would be stored vertically with fuel (but not liquid oxygen) aboard at all times.

The Titan ICBM is expected to become operational at Vandenberg later this year, and one of the most impressive sights on the base is the vast constructional effort which is producing the silo-lift and in-silo launch emplacements for this missile. In the former type the missile is first raised out of its hole for firing, while in the second case it is fired from below ground.

Picking our way between the cranes, tractors and other contractors' vehicles that have stirred up the scrub-desert dust so that everything nearby, even the occasional tree, is covered with a grey powder, we looked down the 165ft well that was well on the way towards completion as a Titan silo. Two massive concrete slab doors, 4ft thick and weighing 180 tons each, were in position at the top of the hole. We imagined them closed, and obtained some idea of what "hardening" a site really means. A smaller hole nearby was to be a personnel access tunnel to the main shaft.

Having seen fixed missile launchers in being or under construction on the ground and below the ground, we were told of a third launch technique which would soon be coming to Vandenberg. The missile involved is the Minuteman, and its launchers will be rail-mounted—capable of exploiting, we heard, "the Southern Pacific Railroad's extensive rail net."

The number of RAF crews who have been trained on the Thor IRBM at Vandenberg and have then returned to man Thor squadrons in Britain is over 1,200. These graduate crews return periodically to the California base to carry out combat training launches, and at the time of our visit a group of 47 officers and men from the Hemswell complex were preparing for such a launch. RAF crews have successfully launched 11 Thors to date.

Sqn Ldr Robert Tate was combat training launch commander of the Hemswell group at Vandenberg. The RAF personnel included three complete launch crews, any one of which might fire the missile. A telemetry check was in progress when we called in briefly at the Thor site, one of two pads used for combat training launches. In order not to "degrade" the operational weapon, the minimum amount of telemetry is used. By protecting cables and other units, the damage to the pad when a Thor is launched can be minimised, and one pad has been made ready for a further launch in the space of only one week.

THE writer, a "Flight" staff-member, is one of a party of British correspondents on a three-week tour sponsored by various US Government agencies. This, his first story, deals principally with missile developments and therefore appears in our regular "Missiles and Spaceflight" section; his story of a day aboard an aircraft carrier is presented separately on page 530. Further accounts of the tour will appear in forthcoming issues.

The Royal Air Force staff permanently stationed at Vandenberg comprises one man—Wg Cdr Peter Finlayson, RAF liaison officer, who showed a film of the successful launching of two Thors which had been brought over to Vandenberg after having been exposed (on site) to the rigours of the British climate.

As we drove away from the missile launch sites, past the fresh green golf course which trickles through the rough brushwood of the base, it was difficult to sort out one's real impressions.

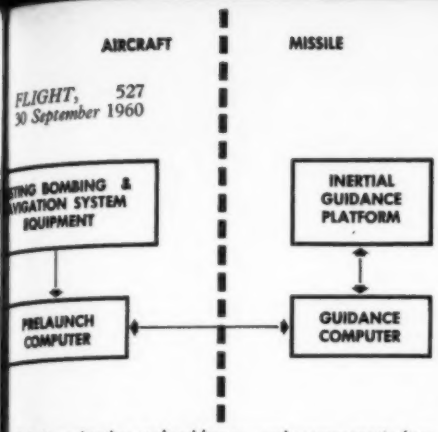
We had seen a colossal constructional effort going into digging deep holes in the ground which, if the deterrent policy succeeded, would be garages, and no more, for expensive and deadly machines of war.

We had stood at the foot of an Atlas, with the hiss of the missile pad-cooling system as a steady background noise, and listened to a 24-year-old lieutenant who was its launch control officer. He wore a revolver on his hip and said he would have preferred to be a pilot, had he been fit enough. "We are an operational site," he said in a relaxed, confident manner, "and right now we have crews standing by in that blockhouse ready to go at any time."

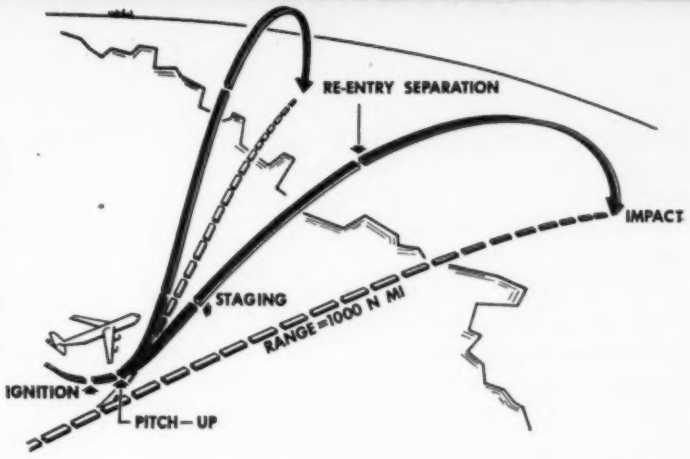
* * *

Our visit to Vandenberg was one item in a three-week tour of the United States sponsored by the Department of Defense, Department of State and the US Information Agency. This was the first full week of the trip, and it included brief calls along the California coast at San Diego, Los Angeles and San Francisco. Our programme included the following events and organizations.

Air Force Association Convention, San Francisco. The full, resounding title of this meeting was, in fact, "Air Force Association Convention *and Aerospace Panorama*" (my italics) and I must



Skybolt navigation and guidance—main components (see col 2). For Vulcan installation, the principal aircraft modifications will be the addition of the pre-launch computer and of underwing pylons. The missile itself will be identical with those carried by B-52s



Typical Skybolt trajectories. One is at angle (horizontal) to aircraft, i.e., the missile can turn after launch and before pitch-up and ballistic trajectory

admit right away that it had long been my ambition to attend an Aerospace Panorama, if only to determine what the phrase meant. I can now reveal, as some of my colleagues on the trip would have put it, that an Aerospace Panorama is what the SBAC at Farnborough refer to as a static exhibition. The AP has certain differences from the big tent at Farnborough, however, which we can discuss later in this article.

The real meat of the convention proper lies in the briefings, presentations and discussion meetings, given by senior USAF and industry representatives to delegates, journalists and specialized groups. Add a few banquets, gimmicks such as the "unveiling" of a missile, and the strange "normal" trimmings of any American convention, and one has an idea of what this was all about. It is worth recalling that the Air Force Association was the prime sponsor of the so-called World Congress of Flight held in Las Vegas last year, which followed a similar pattern.

The convention got off to a good start with a morning briefing by senior officers from USAF Headquarters, led by Lt-Gen Roscoe C. Wilson, Deputy Chief of Staff (Development). Their theme was the future of the Air Force during the next decade. Gen Wilson said:—

"Our future Air Force obviously will use ballistic missiles in large numbers. The majority of these will be relatively economical, highly reliable, solid-fuelled ICBMs of the Minuteman type. They will be made as secure as possible through dispersal and hardening of their sites, and through mobility. A portion of them will be in missile trains roaming the nation's railroads in random patterns.

"Larger ICBMs such as the Titan 2 will be required for certain targets. These missiles, using storable liquid fuels, will be kept on the ready in sites hardened to several pounds per square inch. Such sites will be extremely difficult to destroy except with a direct hit.

"Eventually, it is possible that missile improvements may make even very hard sites vulnerable. In such circumstances we would probably require larger numbers of highly mobile missiles.

"The ICBMs which follow those presently under development may be smaller mass-produced missiles capable of extreme mobility. Some wag has characterized the concept as 'an ICBM in every backyard.' While that is an exaggeration, it suggests the dispersal and mobility that may be required.

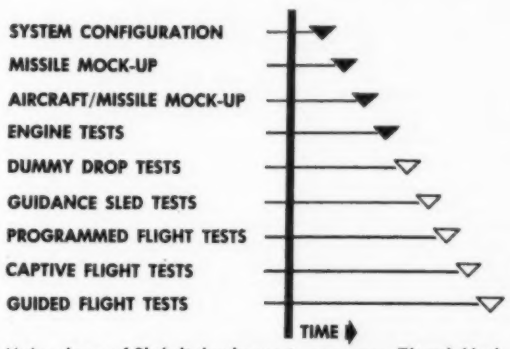
"We are proceeding now with the development of the Skybolt, an airborne ballistic missile system which combines the tactical advantages of both the airplane and the ballistic missile.

"An active defense against ballistic missiles is one of our most complex problems, but we believe that both ourselves and the enemy can achieve such a defense system by the end of the next decade. We must insure that we can penetrate enemy defenses, and our missiles of the future will have devices designed to frustrate and confuse the defense.

"But ICBMs, even though they become more sophisticated, will remain stupid brutes. Only a manned vehicle can provide the flexibility and finesse so vital to victory in military operations. The manned aircraft with the ability to seek out and destroy mobile and hidden targets—to reconnoitre the battle zone—and to conduct residual or clean-up strike operations will clearly be required for the foreseeable future. In addition, the ability of strategic aircraft, armed with ballistic missiles to roam the skies, will permit us to hide powerful and quick-reacting striking forces in the air itself. Such a capability will be further enhanced by use of an aircraft especially developed to remain airborne for long periods, and research efforts relating to such an aircraft are now actively under way.

"Our future Air Force must have sizeable numbers of very high-performance aircraft for both strategic and tactical missions. The B-70 admirably meets our needs for a high-performance strategic aircraft during this decade and beyond. To meet our tactical needs we plan to have a STOL tactical fighter in the operational forces by the mid-sixties. Such a fighter, the first to be capable of sustained supersonic speeds at extremely low altitude, will greatly aid TAC's power to penetrate enemy defenses and will give the command increased operational mobility."

In reply to questions Gen Wilson amplified his remarks on the B-70, disclosing that this programme, which had previously been cut back to one aircraft, without associated systems, had now been speeded up and expanded. The programme had been



Major phases of Skybolt development programme. Though black triangles represent complete phases, engine tests are in fact continuing. White triangles represent future phases

"restored as a development prototype programme," including all systems. The Service needed the B-70 after 1965, he said; the first combat wings could be set up in 1966; and "We're putting forward the B-70 as our priority aircraft."

Douglas Aircraft Co, Santa Monica. At Santa Monica on September 20 the first press briefing was given on the Skybolt air-launched ballistic missile. Within the inevitable limits of Defense Department security, the Douglas company provided a useful general outline of the philosophy behind their development of this hypersonic, two-stage solid-propellant missile.

The history of the missile was first traced by Mr J. A. Gorgenson, Skybolt programme manager, who said that formal USAF design studies of an air-launched ballistic missile system began in 1957. These studies were conducted by 14 different US contractors and supported the design concept. In 1958 and early 1959 the Air Force sponsored feasibility programmes during which ballistic-type missiles were air-launched from USAF aircraft.

Having explored the basic design concept and having actually launched ballistic missiles from an aircraft in flight, the USAF conducted a design competition in early 1959. As a result the Douglas Aircraft Co were awarded a contract in May of 1959 to study further the air-launched ballistic-missile concept.

The objective was to establish a design and programme which would involve minimum developmental risk and provide maximum assurance in meeting schedules. During this study period the Douglas management organization was augmented and the major subcontractors were selected. In addition, associate and subcontractor relationships were begun.

The basic concepts in the Skybolt programme are:—

(1) All design planning and tooling is based on a production programme.

(2) All major facets of the programme are being developed concurrently. (This includes missile system design, ground support equipment, training programmes, handbooks, product support and operational planning.)

(3) All elements of the missile system are being designed to ensure maximum compatibility with the two prime carriers, the B-52 and Vulcan aircraft. This has been interpreted to require maximum utilization of existing aircraft equipment with minimum change, and to involve the addition of only that equipment absolutely necessary to the performance of the missile system.

(*Continued on page 529, after page of Missiles and Spaceflight general news*)

Missiles and Spaceflight . . .

US MOON-SHOT FAILS

The American attempt last Sunday to put a 387lb satellite into orbit round the Moon ended—or began—in failure. The fault lay with the second stage of the three-stage Atlas-Able rocket which, though ignited, burned abnormally. It is considered unlikely that the third stage ignited at all, and that, if it did ignite, it would have been so far off trajectory that it would have plunged back into the Earth's atmosphere and burned out—probably over the Indian Ocean an hour or so after the Cape Canaveral launching.

MINUTEMAN REVELATIONS

As a preliminary to the public "unveiling" of Minuteman at San Francisco, Lt-Gen Bernard A. Schriever, commander of Air Research and Development Command, and other officers concerned with the Minuteman programme, gave details of the missile at a Press conference at the convention (see previous page). Its warhead would have a smaller yield than those of Atlas or Titan, said Gen Schriever, but the cost of the missile would be a quarter to one-fifth of any existing liquid-propellant ICBM. It is slightly under 60ft in length, and weighs 60,000-70,000lb.

It was expected that one-third of the Minuteman missiles would be mobile, i.e., mounted on the special launcher trains which would be used to move them throughout the country's railway network. The remaining two-thirds would be stored at the ready in underground silos. Feasibility tests on the railways had proved very successful, and in fact fewer tests than planned had been required. Fixed Minuteman sites should be operational in mid-1962, with the mobile units following some six months later.

NEW DETECTORS FOR SKYLARK

A Skylark research rocket to be fired in Australia next month will carry new-type micro-meteorite detectors designed and constructed at Jodrell Bank. Dr Roger Jennison, who is in charge of satellite instrumentation projects at that centre, is on his way to Australia to supervise the operation of the detectors and other equipment to be fired in a Black Knight at a later date. Dr Jennison said before his departure that the detectors had been designed to determine the size of micro-meteorite particles and the measurements of other particles smaller than had been measured by conventional techniques.

ORBITAL SCATTER COMMUNICATIONS

The fears expressed by Prof Lovell about adverse effects of the US proposal to assist global radio communication by means of metal foil fragments scattered from an Earth satellite (this page last week) have drawn a comment from a spokesman of Massachusetts Institute of Technology. The foil fragments, he said, were fibres only one-third the thickness of a hair and would be put into two orbits several thousand miles above the Earth, one around the Equator and the other over the poles. A maximum of about 100lb would be put into orbit, and each "needle" would be about 1,200ft distant from its neighbour. "Intensive studies" had shown that, used in this way, they would have no effect on interplanetary observations.

BRITAIN AND SPACE

Speaking in Strasbourg last week, Lord Hailsham, Minister of Science, said that, apart from economic arguments, he thought political arguments favoured international co-operation in space research. Scientific arguments pointed in the same direction. He was addressing the Assembly of the Council of Europe, before which a plan for a Commonwealth/European space "club" had been introduced by Mr David Price.

Broadcasting in Australia, Mr Thorneycroft, Minister of Aviation, declared that the Woomera Range was a first-class example of what co-operation could do. He added that if the Commonwealth and Western Europe could agree to get together on some project, they could command resources greater than either Russia or the United States. He was not talking, he said, about financial resources but about technical, scientific and engineering skills.

"Flight" photograph

Minuteman (with a Titan in the background) being "unveiled" at the Air Force Association Convention in San Francisco (see Kenneth Owen's story in the preceding pages). Gen Thomas D. White, USAF Chief of Staff, performed the ceremony. Other missiles (or mock-ups) included a Thor-Able and a Hound Dog, and a Bell X-15 was among other exhibits

Artist's representation of a Dynasoar flight, which should occur within three years. Boeing are the prime contractor for the system and glider, Martin for the booster

BOEING'S BALLOON STUDIES

It was announced by Boeing Airplane Co on September 13 that their Aero-Space division are to conduct a series of unmanned balloon flights from Seattle to find answers to several cosmic-radiation questions posed by the company's various space programmes. The balloons will be 60ft polyethylene spheres, expanding to 80,000 cu ft at an altitude of 110,000ft. Payloads will not exceed 10lb; data will be telemetered to Earth and the instrument packages will be recovered by parachute.

BALLOON-BORNE TELESCOPES

A USAF contract for 20in reflector telescopes to detect approaching missiles was announced recently by Electro-Optical Systems Inc, of Pasadena. Carried by 200ft balloons to a height of 20 miles, the telescopes, which will rotate, will detect the Sun's rays reflected from missiles several hundred miles away and convert the sightings into electrical impulses which will be transmitted to the ground.

The British Interplanetary Society announces that an additional lecture will be given tomorrow, October 1, at 6.30 p.m., in the York Hall of Caxton Hall, off Victoria Street, London SW1. The lecturer will be Mr Morton J. Stoller, whose subject will be "The NASA Space Flight Programme." Mr Stoller is NASA's assistant director, satellite and sounding rocket programmes, and he will deal with the status of satellites and sounding rockets, lunar and planetary programmes, satellite applications and manned flight.

WEST COAST WEEK

(continued from page 527)

Technical aspects of Skybolt were next described by Mr R. L. Johnson, chief engineer for missiles and space systems, who began by outlining a typical Skybolt mission. "Any well-designed ALBM system," he said, "will not in itself impose restrictions on the alert time of the basic aircraft system of which it is a part. Therefore, no ground operations need be performed except having the missile system equipment maintained and ready to go on the airplane.

"Following aircraft take-off, and when it has been determined that an attack is to be made, the necessary missile system equipment can be activated. This equipment, together with that which is already a part of any bomber aircraft, enables the crew to bring the carrier aircraft to the desired position for launch. At this launch point the necessary information is fed into the missile guidance system and the missile is released.

"This is normally accomplished from level flight by dropping the missile away and then igniting the engine after a short delay. A programmed pitch-up manœuvre performed while the missile is accelerated out forward of the aircraft gradually places the missile on to the appropriate ballistic trajectory.

"After burnout of the first stage and ignition of the second stage the missile guidance equipment assumes control of the missile and guides it to the proper point for second-stage cut-off. Separation of the re-entry vehicle at this point places the re-entry vehicle on course for its ballistic fall to the target.

"Accomplishment of the design of a system for such a mission requires efforts in the fields of guidance, propulsion, re-entry, control and structure for the missile itself, and work on the associated aircraft equipment and ground equipment. The all-important schedule requirements for Skybolt have dictated that each of these areas be attacked on the basis of existing state-of-the-art without major advances being required for proper operation.

"In the field of guidance the only new condition imposed on inertial guidance is associated with the requirement for determining position and velocity at launch. While new to inertial systems, this is not new to bombing and navigation equipment designers for aircraft. Indeed, existing equipment supplies the necessary information to a Skybolt computer based upon existing knowledge.

"The guidance equipment in the missile itself, having only to operate for ranges up to 1,000 n. miles, is a much simpler task than that of guiding an ICBM over distances of 5,500 miles. In the field of propulsion, existing propellants and case materials of known properties need only be modified to the specific Skybolt requirements. Engines of this size and performance are already in production. Re-entry structural and control problems are all similar to existing ICBM techniques but, of course, need not meet such stringent requirements as in the ICBM. The associated ground-handling equipment and ground-support electronic equipment are all based on existing Air Force equipment.

"Any ALBM programme must pass through the typical programme events of system configuration determination, missile mock-up, aircraft/missile integration mock-up, engine tests, dummy drop tests, guidance sled tests, programmed flight tests, captive flight tests, and guided flight tests. On the Skybolt programme the first one was completed many months ago and was based not only on the specific work of Douglas and its sub-contractors but upon the background of studies and experimental launches which had been conducted prior to the Skybolt completion. The next two milestones have been completed on Skybolt, with the fourth one underway with several successful engine firings completed. The remaining milestones are being approached on schedule."

Confidence that the Skybolt time schedule would be met was voiced also by Col L. C. Clausen of USAF Headquarters, who spoke on the military aspects of the programme. A joint executive council of industry and USAF representatives had been formed to ensure that the programme went smoothly and that the job was done on time. The United Kingdom, Col Clausen said, had been in the picture from the beginning.

In addition to Douglas, the principal industry members of the Skybolt team are General Electric (re-entry vehicle), Aerojet-General (propulsion) and Nortronics division of Northrop (guidance). During the early stages of the evolution of the missile, Boeing will assist Douglas in tailoring the missile system to the B-52 aircraft. In the United Kingdom, Avro will be responsible for the Vulcan underwing pylons on which Skybolt will be carried, and for tailoring the missile's guidance to the Vulcan's existing navigation/bombing system. It was emphasized, however, that the actual Skybolts, whether fitted to American B-52s or British Vulcans, would be identical and in fact interchangeable. By 1964, it was stated, both USAF and RAF bomber squadrons would be operational with Skybolt missiles.

Other news released on this occasion included the fact that it would not be necessary for the launching aircraft to turn in the direction of the target before releasing a Skybolt missile. A large angle between aircraft direction and line to target, however, would involve a penalty in range.

Although the decision to fit Skybolts to Vulcans and not to Victors was obviously a United Kingdom Government decision, Douglas had studied the possibility of fitting the missiles to the latter type of aircraft. These investigations had shown that the installation problems would have been more severe, mainly because of ground clearance. The KC135 had also been considered as a Skybolt carrier; the B-58 had not, neither had the TSR.2.

It was admitted that snags were possible at all stages of the programme, and that snags had a habit of appearing during the flight-test phases—which, as Mr Johnson had indicated, all lay in the future. But the company's confidence that major delays were unlikely appeared soundly based on two factors: firstly, the conservative, state-of-the-art or "no inventions allowed" philosophy; and secondly, the "delay margin" for such snags which had been assumed in the overall planning.

There would be no altitude limitation on Skybolt launching, Mr Johnson said. Clearly a high-altitude launch would give superior range, but even when launched from low levels Skybolt would remain a practical operational weapon.

Convair Division of General Dynamics, San Diego. Two brief calls were made at Convair facilities in the San Diego area on September 20, the first to the imaginatively styled plant of Convair Astronautics on Kearny Mesa, outside the city; and secondly to the Convair plant at Lindbergh Field, the municipal airport.

The 250-acre site of Convair Astronautics, and the 12,000

Some 12,000 employees work at the Kearny Mesa plant of Convair (Astronautics) Division. Right, Atlas production line at the plant

WEST COAST WEEK . . .

people who work at the plant, are concerned almost exclusively with the Atlas ICBM, which at the time of our visit had logged 43 completely successful and 10 partially successful firings out of a total of 63 launches. Outside the plant are two large mock-up towers which, if placed one on top of the other and completely sunk into the ground, would reproduce accurately an underground Atlas silo. A third tower nearby is used to test the silo lift (i.e. elevator) system.

On the production line inside the plant, the glistening stainless-steel tubes that are Atlas vehicles are destined for R and D shots at Cape Canaveral, Project Mercury, or the Midas early-warning satellite. The missiles are mounted in elevated docks, with the ground-floor level beneath used for equipment bins and the electronic equipment used for checking the Atlas and its sub-systems.

Apart from spaceflight applications, which will use Atlas vehicles for the next ten years, it is estimated that the production of the military missile will continue for 2-3 years from now to complete the programme. Just about complete, and visible in the plant now, is the first Centaur upper stage, which will be used for a variety of space experiments.

At Lindbergh Field, the San Diego division of Convair is producing the Convair 880 and 600 jet transports and is tailing-off production of the F-106 Delta Dart. Plant 2, where the F-106 has been manufactured, covers 1.5m sq ft of floor space and was previously used for production of F-102 Delta Daggers and, during the last war, of B-24 Liberators.

This plant has a complete machine shop set up for F-106 detail parts; a chemical and physical laboratory; paint and chemical etching department, electric wiring bench, mock-up areas plus sub-assembly and final-assembly lines. A field operations centre on the far side of the airport provides servicing for F-106s before their first flight to the company's production test facility at Palmdale. From Palmdale these aircraft are delivered to the USAF. Engineering flight-test work is carried out at Edwards AFB, and armament tests at Holloman AFB, New Mexico.

Other divisions of Convair are at Pomona, California, where Terrier and Tartar missiles are in production; Fort Worth, Texas, where the B-58 is being built; and Daingerfield, Texas, which is a research centre for rocket engine development.

ABOARD USS "KEARSARGE"

IN the foregoing pages Kenneth Owen gives accounts of his visits to various United States missile and aircraft facilities. Below is his story of a rather different kind of day—aboard a carrier—which also formed part of his US tour

FROM headquarters of the US Naval Air Force, Pacific Fleet, at the North Island Naval Air Station, San Diego, the commander of this force, Vice-Admiral Clarence E. Ekstrom, is responsible for the strategic distribution of all USN aviation units in the Pacific area. He prepares general policy for the operation of these units and recommends the numbers and types of aircraft required. His parish covers 64 million square miles of ocean.

Admiral Ekstrom was our first official host during the tour, when we visited him and one of his carriers on September 18-19. Operating from west-coast ports in the USA, his carriers serve on duty on a rotation basis with the US Seventh Fleet in the Far East. Between periods with the Seventh Fleet, the ships return to California for re-training and repair.

We spent a day aboard USS *Kearsarge*, an anti-submarine carrier (CVS-33) which, in the absence of a training carrier as such, was being used temporarily for the training of pilots in carrier operations. Later the carrier's own air group would embark, and the ship would work-up and join the Seventh Fleet.

Commanded by Capt P. W. Jackson, the *Kearsarge* is flagship to Rear Admiral R. L. Townsend, who is in command of Carrier Division 17. From the many experts aboard the ship we heard the overall case for sea power—the first presentation began with a colour slide stating "The trident of Neptune is the sceptre of the world"—and a few specific details of the Navy's latest developments. Among these were several comments on Polaris.

At the time of our visit the first firing of an "operationally configured" Polaris had taken place some five days previously. Following on from this, Admiral Ekstrom said that Polaris would be operational (aboard USS *George Washington*) "within a few weeks." By the end of the year a second Polaris-carrying submarine, the *Patrick Henry*, would also be operational. The range of the developed version of the missile, to be achieved some time in the future, would be 2,500 miles.

The US Navy would like 40-45 Polaris submarines as a target figure, but this number had not yet been authorized. It was only wise to assume that the Soviet Union was "not very far behind" in a similar development. The USA was more vulnerable than the USSR to attack by Polaris-type missiles.

A Navy spokesman agreed with a suggestion that at present anti-submarine weapons were ahead of the available detection systems. In connection with the Asroc short-range anti-submarine rocket, however, a new detection system had been developed and was now being tested aboard the destroyer *Norfolk*.

Flying demonstrations staged during our day aboard *Kearsarge* included a demonstration of tracking and attacking submarines by HSS-1 helicopters and Grumman S2F aircraft; touch-and-go deck landings by McDonnell F3H Demons and Douglas A4D Skyhawks; and deck landings and take-offs by Grumman S2Fs. But the most impressive sight came that night, when we watched the weird shapes of the "Turtles," alias Grumman WF Tracers, carrying their monstrous saucer-like radomes, engaged in night landings and catapult take-offs.

Next morning we left the carrier by free take-off from the deck in Grumman TF-1 Traders. Normal complement of aircraft aboard when the carrier is operating in its anti-submarine role would be S2F Trackers, AD5W Skyraiders and HSS-1 helicopters.

Right, USS "Kearsarge" refuelling at sea. Below, Grumman WF Tracer

Airport with Ideas

A WALK AROUND COPENHAGEN'S KASTRUP

Kastrup's new terminal and its two fingers—with provision for a third to the right at a future date. The interior is designed to be altered easily and without undue expense

A RECITATION of facts and figures about a new airport, useful though it may be for some purposes, does not really contribute much to the art and technique of airport design. Basic information can be obtained from government sources that are only to eager to provide full facts about civil projects upon which so much public money is today being lavished. For example, you can read about the new airport at Kastrup, Copenhagen, that construction began in September 1957, and that it was opened in July of this year; that the original budget was Kr 165 million (£8½ million) and that by the time it is completely finished it will have cost perhaps Kr 200 million (£10½ million); that it has a capacity to handle the two million passengers expected in 1968 at a peak rate of 1,640 an hour; that runway 04/22 is 11,000ft, and runway 12/30 9,300ft, and so on.

But those who are planning new airports—including the long-haul terminal at London Airport now under construction—are perhaps more receptive to new *ideas*—ideas for improving the efficiency, comfort and convenience of the passengers and the people who will serve them. At least this is what one hopes.

We tried to assess the new Kastrup terminal not only from the aesthetic viewpoint—this after all is largely a matter of personal taste—but also from the "ideas" angle. First, aesthetics. Connoisseurs of airport art forms will probably find little to offend at Kastrup. One's first impression is of apparent vastness: yet the dimensions, 530ft by 225ft and 40ft high, betray the illusion. Perhaps the great expanses of uncluttered floor—left clear to allow for future expansion of the amenities without costly alterations—account for this illusion. There is plenty of colour. The ceiling, perforated with big glass cupolas to let in natural light, is blue, the walls are pale green, the walkways and stairs are white and their rails are red and black. The doors are of natural wood, all the partitions are grey, and there are large expanses of glass screening which always enhances spaciousness. There is a feeling, hard to define, of Scandinavia.

One final word on aesthetics: colours, textures and materials are cleverly used to give an overall impression of cleanliness, spaciousness, and light, and there are no gimmicks like Gatwick's rough unfinished concrete columns, which—one is told—are meant to give an impression of structural strength, but which to most eyes look just like rough unfinished concrete columns.

Let us look now at the good ideas that abound in Kastrup's new terminal. Some of them are expensive, most of them are not. The best idea of the lot, which could be a bit expensive but which should certainly pay for itself, is a computer which automatically processes all passenger check-in data and computes aircraft weight and balance. This allows airlines using Copenhagen to accept passengers only 10min before flight time. It is unique so far as we know, and its advantages will not be lost on any operator of 150-seat jet aircraft (or even 50-seat piston aircraft). It means the abolition of the passenger manifest, but the Danish Government did this some time ago. The system guarantees that airlines do not overload—which is easy to do when passengers check in at a number of physically separate counters. And it benefits the passenger, who need no longer check in half or three-quarters of an hour before departure.

Another idea that was new to us, and which if installed *ab initio* should not be too costly, is what the man who played a large part in the designing of Kastrup, Henning Betak of SAS, described to *Flight* as "a baggage carousel." This is a large turntable on to which the baggage is fed from the counters by conveyors. The porters stand round it, or climb on to it, grabbing the baggage labelled for their particular service, flight numbers being placarded circumferentially round the carousel. It is said to avoid confusion, and it certainly appears to economize in floor space.

We particularly noted the clarity of the public address (visual closed-circuit TV and audio) system. Plentifully distributed around the departures hall and transit lounge on the first floor are television screens displaying departure flight numbers and times. Every so often, heralded by a soft chime, the unattainably beautiful face of a girl appears and she announces, in Danish, English and German, the departure of each flight. The quality of the loudspeaker system, which is by AEG, is exceptionally good—a nice change from the incomprehensible percussions still so prevalent at airports. Of music, so pleasantly dispensed at New York, there was none; perhaps it is worth trying.

The TV screens reflect images of the building's windows, making the departures information rather difficult to read; non-reflecting screens are available and are to be installed.

While we waited for our flight to depart we watched an old lady of at least 70 arrive in the transit lounge. She was all by herself, looking a little worried, and was absolutely bowed down with hand baggage. Here, we thought, comes a typical airport design case. She dumped her bags by one of the many movable armchairs, and while wondering what to do next she spotted one of the television screens. She went up to it and peered closely, evidently soon being satisfied that she was in the right place in good time. She checked her watch by one of the great number of clocks around the transit lounge (we counted six from where we were sitting) and then strolled around among the shops. These appear to provide for almost everything a passenger needs and at prices not too greatly above those in the city [all profits above a certain amount go to the Government, we gathered]. She visited the duty free shop, which is run by SAS at a profit, and which

(*Continued at foot of page overleaf*)

"Colours, textures and materials are cleverly used to give an overall impression of cleanliness, spaciousness, and light . . ." The departures and transit lounge, and the shops are upstairs

IATA's Annual General Meeting: a Postscript

LAST week's issue included reports from the 16th annual meeting at Copenhagen of the International Air Transport Association, September 12-16. Here, by way of a postscript, are J. M. Ramsden's general impressions of the occasion.

IT is only too easy to enjoy the lavish hospitality of an IATA Annual General Meeting and then to have a cheap jibe at the extravagance and expense of it all. Such sneers have probably been heard during and after all of IATA's 15 previous AGMs, and one heard them during the 16th of these meetings in Copenhagen. "I expect the fares will be going up next year," someone said during the coffee interlude at the Falkoner Centret (where the working sessions took place) while discussing Wednesday's all-day outing as guests of SAS—who, of course, were the host airline this year. We had been to Frederiksborg Castle, in whose beautiful chapel 350 people of 50 differing nationalities had listened spell-bound to a recital on the same organ that King Christian IV heard 350 years ago. We had been shown the castle at Elsinore, and we had spent five hours aboard a sumptuous motor vessel which had taken us to Malmö, Sweden, and back. During a discussion of how much it must have cost to charter the *Orange Moon*, and provide the simply wonderful Scandinavian *smorrebrod* luncheon aboard, someone said: "Pity about these low IATA profit margins."

Such remarks are uncalled for, though these annual five-day occasions, which unfailingly draw the world airline industry's Top People and their wives each year, are indeed costly. But the very fact that all these senior people do consider it worthwhile to tear themselves away from the consuming, high-tempo business of air transport suggests that the money is considered to be well spent.

The reason becomes apparent during the week. The working sessions, of which there are half a dozen, are well attended and they are closed—with the exception of the opening and closing sessions—to the Press. This means (we must concede) that every-one can, and does, speak his mind without fear for the headlines in the following day's papers. "What am I to do?" Sir William Hildred, IATA's director-general, is reported to have said during one session concerning the particularly delicate matter of IATA's fares machinery, "what the *hell* am I to do?" An African airline man said afterwards: "I liked the way he said that, though I don't agree with him on this point." These working sessions ensure the democratic functioning of IATA; despite what is often said, the year's work by IATA's civil service and its specialist committees is not just rubber-stamped without question.

Everything controversial gets an airing. Some of the smaller airlines feel, and said at Copenhagen, that IATA's executive committee is too exclusively composed of big-airline presidents. And other airlines, big and small, wanted to know why Mr John Brancker, IATA's traffic director, had been fired by Sir William. This particular episode—the rights and wrongs of it aside—revealed that the currents of nationalism within IATA, though ever-present, do not sway every issue. In this case one IATA officer, an Englishman who has commanded the respect of most of IATA's 89 airlines, is dismissed for "personal" reasons by his senior—also an Englishman, and who likewise seems widely respected (notwithstanding the dissent of American Aviation Publications Inc). The rumpus was whether the men concerned were doing their jobs properly; we detected no whiff of nationalism in the dispute over Mr Brancker.

Sir William's spry person was everywhere, sometimes in grave discussion, more often making people laugh. He is a most accom-plished dispenser of *bons mots*, and nothing seems to ruffle his good spirits. However delicate the subject he always manages to find the right phrase, which even if it does not solve the problem, makes everyone want to work together to solve it. For example, asked to explain what he meant by the "confused" situation in South America, where a bitter rate war is raging, he says: "The air is South America's life. It is a lively, vigorous industry. If the situation were not confused I would not sleep." When asked about those IATA officials who go around the world spying on members who undercut their competitors' fares—an enforcement system of which IATA cannot feel exactly proud—he says: "Some airlines want the fines increased. Others think it better to pay up and shut up." To speak with the voice of 89 airlines without offending anyone, and at the same time never to be platitudinous, is Sir William's contribution—no mean one—to international air transport.

The working sessions are well attended, but they are not the main attraction. What empties airline front offices and brings their occupants together at the a.g.m.s is the unique opportunity there is for talking shop. There is scarcely one airline president who, putting his hand in a hat, could not draw out the name of another with whom he would have something to talk about. On board the *Orange Moon*, when the party has really warmed up (with Viking warriors wildly playing the most agreeable dance music), an Italian talks about his surplus Convairs with a Brazilian. An American agrees with a Frenchman that aircraft manufacturers' representatives ought to be at the party. And, depressingly, a European airline engineer deplores in the strongest terms the after-sales service he gets from certain British equipment manu-facturers. Of one particular unit he says: "The British unit has a life of 500hr. For the same price I can buy an American unit with a life of 7,000hr, with better service and immediate delivery." He is, he says, sorry to have to say these things.

An American cargo line man says: "The CL-44 means five or six instead of 10 cents. It may not work out so good, but even if it's 25 per cent down we're still winning. We're a bit worried about the Tyne, but Rolls have a tremendous reputation." A senior engineer of a European jet operator, talking about Smiths' autoland system, says: "We've looked at it and were impressed. At the moment we think that Lear have got something worth looking at too." Another says of the D.H.121: "We have to ask ourselves whether to buy the Douglas Caravelle 14 for 1962, or to wait two more years for the 121." A senior British airline man says: "Pooling has become a very big issue at home." Another says: "We could use and fill six Argosies tomorrow if we could afford them." Of Air-India someone says: "They are working out whether it is cheaper to have four 707s plus four 600s or 720s, or seven 707s." Talking about Braniff, someone says that Mr Beard is thinking of buying a large number of Avro 748s.

And so on. Some big things result from the shop that is talked at IATA's a.g.m.s. After all, the seeds of Air Union and the SAS/Swissair partnership are said to have been sown at the 1956 and 1957 meetings respectively. What may come out of the informal shop-talk that took place at the Copenhagen meeting?

The Airport with Ideas (*continued from page 531*)

of course is one of Kastrup's best known amenities. She returned to her chair after about a quarter of an hour's wander round, settled herself down with a box of chocolates, and contemplated the Caravelles and DC-8s to-ing and fro-ing—in complete silence so well sound-proofed is the terminal building—on the apron outside. At every chime she looked at the television to see whether her flight was being announced. Not once after her initial bewilderment did we see her looking anxious or worried or asking anyone for guidance or help. The design case had been met.

A good idea particularly worth mentioning is the arrivals board which faces friends and relatives when they enter the building to meet a flight. This is not one of those huge British Railways-type boards, out of which fumbling hands keep appearing to insert letters and numbers. Instead, Kastrup's arrivals board is a much magnified projection of a small board in an office which a girl can amend with a crayon or by sliding in fresh perspex sections. The apparatus is called Vu-Graph Type 600, and it is made by a French firm called Millham. It costs only about £150 and it is very simple to use and perfectly easy to read.

You reach the aircraft by way of one of two fingers—finger A which is 820ft long, or finger B which is 980ft long. These are quite long walks, especially if your aircraft is parked right at the end, and no travelator is fitted for reasons of economy. But, statistically speaking, most passengers walk less than half these distances. We noticed some arriving passengers propelling their baggage with merry laughs in the babies' push chairs which are thoughtfully provided parked in each finger. These passengers were anticipating the eventual provision of special push trolleys designed for this very purpose.

Outside on the apron there are more good ideas—and again things that were new to us. For example, each aircraft parking stand has, flush with the tarmac, a number of lighting strips that are switched on when dusk falls and whose soft light diffuses to illuminate the whole of the underside of the aircraft. No more dazzle from obstructive arc lights, which powerful though they are still do not illuminate the insides of aft baggage holds and access hatches. Also set in the tarmac are power supplies, tele-phones and hydrant fuel dispensers.

Looking ahead, Kastrup's planners think that the "nose dock" system of loading and unloading big jets will be incorporated, with perhaps telescopic bridges between the finger and the air-craft. Sweden and Norway are financing their own international airports, too, and if these are as good as Kastrup they will be very good indeed.

J. M. R.

FLIGHT SYSTEM SURVEY

Components of the Ferranti airstream direction detector for Scimitars, Sea Vixens and Buccaneers: 1, probe cover; 2, probe unit; 3, servo generator; 4, head-down display; 5, head-up indicator light box; 6, controller. (See first item, col 1)

Airstream Direction Detector

FROM a system produced by Specialties Inc in America, Ferranti have developed an airstream direction detector which is now to be fitted to Scimitars, Sea Vixens and Buccaneers. In these aircraft an instrument and a head-up display will be provided in conjunction with the standard audio indicator system to allow precise angle-of-attack flying during carrier approaches and take-offs, and when flying for range. The detector is also expected to find a ready civil market and can be applied to test flying and recoverable missile control. Angle of attack could monitor automatic throttle systems for cruise control or determine bank limitation during violent manœuvring.

The sensing consists of a stainless steel probe, heated for de-icing, in which slots in the airstream and sheltered from it are connected to either side of a bellows mechanism. A servo rotates the probe to zero the pressure differential and align the slots with the airstream. Two potentiometers sense the angular position of the shaft axis and supply signals to the indicator dial on the instrument panel and to the servo unit which operates the lights in the head-up indicator on the cockpit coaming and the audio unit. The indicator consumes only ½W at 28V and AC supplies are required for the servo unit. Compensation is provided for airflow disturbances at transonic speeds.

The detector may also be used for side-slip indications for stability augmentation or side-slip signalling to a fire-control system. Accuracy of the detector is better than 0.1° at speeds over 90kt and the time constant varies between 0.07sec and 0.014sec at Mach numbers between 0.15 and 3.0. Continuous readings can be given at speeds from 60kt up to M4.5.

Salford Minitest Multi-range Test Set

Salford Minitest test set described in this column

UNDER the above designation, Salford Electrical Instruments Ltd, a subsidiary of GEC, have produced a pocket-sized, high-sensitivity test set for measurement of AC and DC volts, DC current and resistance. The instrument is based on high-quality components mounted on a printed circuit board and housed in a melamine cover moulding with steel case to screen external magnetic fields. The movement is of the permanent magnet, moving coil type and a 12-position switch allows selection of ranges from 0 to 1,000V AC and DC, five Ampere and three resistence ranges. The meter weighs 18oz and measures 5¾in×3¾in ×2¼in over all.

Narco's New Lightweight ADF

FURTHER details have now been released by Narco concerning the new lightweight ADF first announced earlier this year (these columns, May 6). Designated ADF-29, the unit weighs 8lb, contains only one moving part—the indicator needle—and, being fully transistorized, consumes only 0.54A of current. It is now in production and costs $895 (about £320), the only ADF available in the US for less than $1,000.

The ADF-29 derives its directional information from the strongest signal rather than from the weakest signal traditionally used by null-seeking rotatable loops. Sharper directional sensitivity is thus possible and static interference can be greatly reduced. The aerial consists of three fixed loops concentrically mounted at 120° to each other on a flat plate which is attached to the skin on the underside of the airframe. Directional information is fed directly to the oil-damped indicator needle.

No separate power supply or amplifier is needed, so that the complete electronics, controls and indicators fit into a single panel-mounted unit 8in deep fitting in a cut-out measuring less than 7in×3in. The two-band tuning scale covers all frequencies between 200kc/s and 1,620kc/s with a changeover switch for aeronautical and broadcast bands. A function switch has test, ADF, automatic volume control, manual volume control and off positions, the AVC setting being used for MF range orientation.

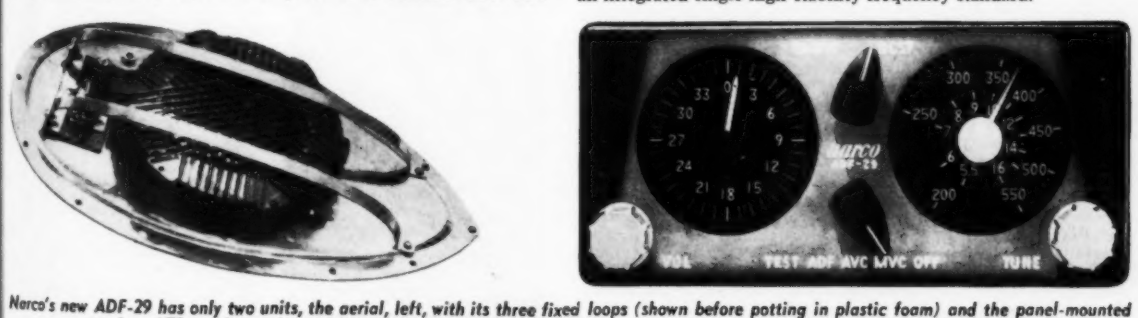
The Airlines and Doppler

THE view of IATA's technical committee, as expressed by its chairman, Mr Knut Hagrup of SAS, at the Association's recent a.g.m. in Copenhagen, is that IATA studies clearly indicate that "Doppler, even in association with heading-reference inputs now available, will greatly enhance the accuracy of aircraft navigation and the possibility of better use of airspace through a substantial reduction of present horizontal separation rules." It was, he said, very likely to have a favourable effect on fuel-reserve requirements.

"We are so keen on Doppler from what we have seen of it," continued Mr Hagrup, "that I would not be surprised to see more and more airlines buying it." There were some technical weaknesses—computers and heading reference, for example—but "we have much more accuracy than with present equipment." A point of particular interest from IATA's point of view was that, being self-contained, Doppler was exempt from governmental charges, though IATA was not saying that existing ground aids were not needed—"only the big airlines can afford to buy Doppler and its back-up systems."

SSB for SHAPE

AN order worth £100,000 has been placed by SHAPE with the Racal Organization for air transportable single-sideband HF radio stations. The stations are entirely self-contained and include their own power supply, aerials and a comprehensive centralized control system. The radios are among the first of their type in Europe designed to permit highly accurate setting of frequencies against an integrated single high-stability frequency standard.



Narco's new ADF-29 has only two units, the aerial, left, with its three fixed loops (shown before potting in plastic foam) and the panel-mounted receiver. The only moving part is the indicator needle. Weight and price are respectively 8lb and $895 (about £320)

DOCTORS and the AIR

Work of the RAF Institute of Aviation Medicine

Not a 1960 knight in chain mail, but Flt Lt J. Billingham testing a plastic insulated resistance wire suit, worn to determine body temperatures. At the right is F/Sgt F. Weston

IF you broke a leg or had a heart attack while visiting the Royal Air Force Institute of Aviation Medicine at Farnborough, Hants, you would be in the happy position of having about twenty doctors within call. But normally the Institute's medical officers are not engaged in caring for the sick; there is not a bottle of pills or sheaf of prescriptions to be seen. The term "aviation medicine" does not imply mixing tonics for tired aircrew; it is medicine in the preventive rather than the curative sense, the art of assisting human physiology to withstand the stresses of flight. The doctors who head the Institute's staff carry out experimental research to this end.

Last week, *Flight* accepted an invitation to visit the Institute to see what goes on there, and considerable trouble had been taken by the staff in laying out demonstrations of their work. Unfortunately, the visit was all too brief; it needs more than a day for the average layman to gather more than a tithe of what is going on. No visit to the Institute, with all that is going on there, could ever really be long enough. But at least it was possible to gain an impression of the width of investigations pursued, and of the care and patience with which research is carried out.

The Institute's premises are next door to those of the Empire Test Pilots' School, in the south-east corner of Farnborough airfield. Nearby are the remains of this year's SBAC Show, its canvas being gradually furled; though whereas that event comes and goes, the work of the Institute goes steadily on throughout the year, gaining in importance from one year to the next.

It all started in 1939, when a small RAF Medical Section was established within the Royal Aircraft Establishment at Farnborough. During the Second World War, rapid progress in aeronautical development brought about a need for closer investigation of associated medical problems; so in 1945 the RAF Institute of Aviation Medicine was brought into being at Farnborough, charged with the task of "studying the causes of inefficiency in flight and impairment of safety in any emergency."

The Institute has always been controlled directly by the Director-General of RAF Medical Services (at present Air Marshal Sir Patrick B. Lee Potter), and it was initially commanded by Professor Sir Bryan Matthews. Since 1946, however, the CO has been Air Cdre W. K. Stewart, CBE, AFC, BSC, MB, ChB, and it was he who made us welcome last week. In 1957, Air Cdre Stewart left the Institute temporarily to undertake special studies at McGill University, Montreal, as a research associate in the Department of Psychology. During his year's absence, command was assumed by the present deputy CO, Gp Capt H. L. Roxburgh, OBE, BSC, PHD, MB, ChB. It should be noted that both these officers hold scientific as well as medical degrees; and this applies to many other members of the Institute's senior staff.

Work at the Institute may broadly be said to be carried out on two levels, the continuous investigation of newer aspects of "old" problems—such as lack of oxygen, and the effects of acceleration, heat, cold, noise and vibration—and research into new problems associated with future generations of aircraft, with their higher performance and greater potentialities. Looking into the future, the Institute defines its task as that of applying and developing the potentialities of biological knowledge "so that flying personnel of the Royal Air Force, the Royal Navy and civilians can, with efficiency and safety, do the tasks of future years even if aided by automation and computation in a manner of which only glimpses are available today."

Mention of the Royal Navy and of civilian flying personnel is significant, for the Institute's work is not exclusive to the Royal Air Force, and its findings and developments benefit aviation generally. There are some Naval officers on its staff, and one of the most interesting features of last week's visit was a film showing work they have been doing on under-water ejection at Glen Fruin, the Admiralty's hydro-ballistic research establishment in Dumbartonshire. This film demonstrated a new method of escape, by means of a compressed-air system; and it showed how research into under-water ejection from the D.H. Sea Vixen has suggested the effectiveness of a small hatch in the side of the fuselage, opening automatically when the aircraft has sunk to a depth of six or eight feet. This facilitates subsequent opening of the cockpit canopy. The method is so far in the experimental stage; but those who have been working on it are hopeful of its being adopted.

The Institute, with a total staff (including civilians) of about 120, has modern laboratory facilities with which to pursue its work; and its premises are being extended with the addition of a very-high-pressure decompression chamber and further space for high altitude research. Perhaps the most spectacular item of existing equipment is the rotating chair for negative g tests, in the centrifuge chamber. Looking rather like a somewhat macabre fairground sideshow, it consists of two horizontal crane-like arms extending from a central floor-based flywheel, with two "cockpits" which can be installed at either end of the arms. A medical officer sits at the inner end of the arm during an experiment, to observe and control it, while one of his colleagues acts as subject. It is an important and interesting fact that members of the Institute staff regularly act as "guinea pigs" for experiments. Although the rotating chair was not shown in action last week, there were plenty of other "live" tests to be seen—on another type of rotating chair, for vestibular studies ("vestibule" being the bony labyrinth of the ear), with the patient's eyes being watched on a TV screen as he is moved around; on a couch, with the subject's left leg bent upward while he lay face downward, for the measurement of electrical activity of muscles during a simple task; and in the experimental pool, where new types of dinghies and sea survival equipment are tried out.

Perhaps the clearest way of indicating the scope of the Institute's work is to list the different sections into which it is divided.

"Flight" photograph

SAC Brown in the two-axes rotating chair for vestibular studies, simulating conditions likely to be experienced in a spinning aircraft

Dr G. B. Byford demonstrating the eye movement and optokynetic test, in which the eye stays still while objects move across its line of vision. A plastic mould is placed on the eyeball, carrying a stem surmounted by a miniature electric light bulb

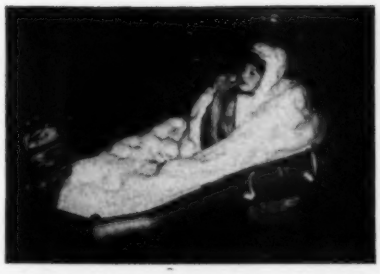
These are as follows: applied physiology, its research pertaining to flying clothing and equipment; biophysics; climatic; acceleration (a film was screened during last week's visit, showing live tests of sudden deceleration, on a rocket-powered sledge mounted on a ground track); high altitude; neurobiology; psychology (this section having as one aspect of its work the investigation of parameters of peripheral vision); biochemistry; and instrumentation.

It would be presumptuous, on the basis of such a short visit, to attempt to describe comprehensively the activities of the devoted researchers who form the Institute's staff. (It should be emphasized that the medical officers are all specialists in their particular spheres, and the normal RAF tour of duty does not seem to apply here. The CO has held command continuously since 1946, apart from his sabbatical year at McGill; and apparently some of the doctors who came into the RAF on National Service and were posted to the Institute subsequently "signed on" to continue their work.) One or two of the activities which were on show last week may, however, be mentioned particularly to indicate practical implications of the Institute's work.

In the pool where air/sea rescue equipment is tried out, a new type of self-inflatable dinghy was demonstrated. This is still in the experimental stage, its chief purpose being to aid the chances of survival of aircrew rendered unconscious after ejection (the airlines are interested in work done on dinghies at the Institute). There were new types of aircrew clothing on display: electrically heated underwear, in which three-ply Terylene yarn is woven with 60/0016 silver-plated copper wire; a pressure jerkin with nylon lifejacket, the right-hand half of the lifejacket being made conspicuous with fluorescent colouring, to aid searchers in the event of SARAH or SARBE beacon failure; a flying suit with parachute harness inside it, and clips on the outside for an observer-type parachute. Another aspect of research in the applied-physiology section was work on an integral type of flying helmet, combining the present type of helmet and the bone-dome which are now worn separately: there is a test rig for measuring the efficiency or otherwise of various types of bone-dome. The high altitude section gives training to test pilots in the use of pressure jerkins. RAF aircrew indoctrination in such equipment is normally provided by individual Commands.

In all its new developments the Institute enjoys the co-operation of manufacturers, sometimes with the introduction of improvements to existing equipment, sometimes in the devising of entirely new items. But one point should be made clear. Nothing new goes into operational service until it has been thoroughly tested by the Institute and found to perform—and perform efficiently—the function for which it was planned. H. W.

Doctors and the Air . . .



"Flight" photographs

Glamour afloat at the Institute: Miss Anne Wakeley, a technical assistant, demonstrating the new type of single-seater dinghy

Practical investigations form part of the work of the Institute staff: here Surgeon Lt Cdr Rawlings is lowered into the experimental pool to be tested on the effect of linear and angular acceleration on the precision of hand-eye co-ordination

THE FIRST PARIS-LONDON FLIGHT

JUST after tea on a fine sunny Tuesday—September 6, 1910—I saw a Blériot monoplane circle the Crystal Palace. It looked as though the pilot intended to land there, but did not like the look of the tree-girt space; so he turned South and landed on the New Beckenham Cricket Club's ground, slightly damaging his undercarriage and breaking his airscrew on some palings.

The pilot was Johnny Moissant, an American of Spanish descent; and this was the conclusion of the first flight from Paris to London, which had started at Issy 22 days previously.

I was quickly on the scene at Beckenham and saw Moissant and his passenger-mechanic, Albert Filieux, looking happy they had reached their goal. The cricketers were not so happy as the tail-skid did a bit of no good to their pitch and they were muttering "These darned foreigners who don't understand cricket! What else could you expect." The Press were about equally divided whether the pilot spelt his name with one "s" or two; so I got his autograph, and he spelt it with two.

The cricket ground is now a part of the National Provincial Bank's sports ground and a project is afoot to put up a plaque to commemorate an historic flight—historic for another reason also, because it fired the imagination of young T. O. M. (now Sir Thomas) Sopwith, who decided he must fly too.

Johnny Moissant had left Issy—the present Paris Heliport, but then the Blériot school aerodrome—on August 16, bound for London. The two-seat Blériot was powered by a 50 h.p. Gnôme (which actually developed about 35 h.p.), so with Moissant and Filieux weighing 12 stone each the engine was hard put to it. On the first day they reached Amiens and flew to Calais the next morning; then they crossed the Straits of Dover, landing at Willows Wood, Tilmanstowe, a few miles from Dover. This was the first aeroplane crossing of the Straits with a passenger, and the fifth in history.

It so happened that T. O. M. Sopwith was becalmed in the Channel in a 600-ton schooner, with his engineer Fred Sigrist in charge of the auxiliary engine. They put into Dover Harbour, where they heard that Moissant was down in an aeroplane awaiting improved weather before resuming. Both went over to Tilmanstowe to see the flight resumed—and Tommy was bitten then and there by the aviation bug and never recovered from its effect.

It seemed that the rest of the journey would be relatively easy. Alas for false hopes! For days it was wet and windy but on the third day Moissant started again; but after flying over Canterbury he was forced down at Sittingbourne with a broken valve. Filieux effected a repair and they soon got going again. But more engine trouble forced them down in a field at Upchurch, where they broke the airscrew and damaged the undercarriage on soft ground. By the time a new airscrew had come by boat and train from Paris Filieux had put the undercarriage right, but by then the wind was far too strong and they deemed it wise to wait.

They took off next morning in the calm of dawn but the wind soon freshened and turbulence in the Kentish hills forced them down at Gillingham after only three miles. Conditions remained bad till August 22; but by then Moissant was impatient and decided to press on regardless and they took 58min to fly 19 miles to Wrotham, where they landed for fuel; and when they got going again they took 27min to cover four miles to Kemsing, where the undercarriage was damaged again; Filieux soon repaired it, but again they had to wait some days for the weather to improve. (Years later, in the early days of airline flying, the district was known as the Valley of Death by reason of the turbulence so often encountered there.)

Moissant and Filieux got going again on the 22nd day, September 6, but were forced down yet again—in a cornfield near Otford—by more valve trouble. This was soon rectified and they flew on to circle the Crystal Palace at 500ft that afternoon before landing at New Beckenham.

Johnny Moissant was killed in his Blériot on the last day of 1910 trying to beat more foul weather in an attempt to win the American Michelin Cup for the longest non-stop flight before the end of the year. But his niche in history is secure.

On April 19, 1911, Pierre Prier, chief instructor of the Blériot School at Hendon, made the first non-stop flight between the two cities, flying from Hendon to Issy in four minutes under four hours. The flight was a sensation, for the quickest journey by boat and train took seven hours.

GEOFFREY DORMAN

ROE 1 *Christopher Storey*

NOW at London's Guildhall (and continuing until October 8) is the seventh exhibition of the Society of Aviation Artists. It was opened on September 21 by Air Chief Marshal Sir Thomas G. Pike, Chief of the Air Staff, who in a brief speech first paid tribute to the encouragement given by the SAA to amateur artists in the RAF and then went on to outline the importance of the Society's acceptance of the task of painting history as it is being made. So fast was progress in our contemporary world, he said, that events of today were all too soon blurred by the passage of time.

The offering this year is of as wide a range as before, from Christopher Storey's bright and lively scene as the A. V. Roe triplane of 1909 is wheeled out for flight to W. Howard Jarvis's visions of the future, in one of which a dark arrowhead purposefully levitates itself from the "rotunda flight deck" of a city air terminal.

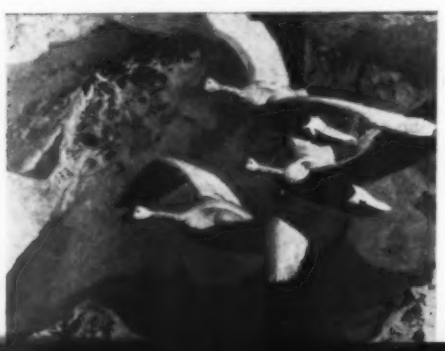
Nearby one is attracted to *The First Snow*, by A. Egerton Cooper. Bleakly lit by the rays of a wintry sun, this high-altitude vista of a snow-clad countryside evokes the smell of wood smoke spiralling up into the sharply cold air.

In contrast is the shattering roar and shimmering fury suggested by Harold Dent's *Maximum Thrust* as an aircraft hurtles away in an explosion of orange and blue violence. And with the same suggestion of power in Kenneth McDonough's painting, two Javelins thunder off the runway, sharp snouts pointing skyward to the murk of rain and mist that lies in wait, to join two others in misty silhouette above. Impellingly attractive is *Nocturne - Snow Geese*, by Keith Shackleton —a strong composition in which the birds thrust themselves forward with powerful wing strokes through an ice-blue moonglow. In *Bomber's Moon*, by John Lamb, and also nocturnal, a lone Lancaster wings desolately overhead across a night-dark sky, scarcely lit by a veiling moon that dapples the clouds to a paler amber glow.

Almost photographic in appearance, but attractive in its warm pink colouring, Derek Morgan's *Qantas Air Liner* shows in a most photogenic manner a sleek 707 sliding gracefully through the clear sunlit air high above woolly clouds. Nostalgic indeed to many will be *Stormy Return*, by C. W. E. Waller, a fine painting of a Spitfire taxying to dispersal under a rainwet sky as night clouds gather. Overhead another aircraft swings in to land ahead of others orbiting and half seen in the lowering visibility.

No one picture dominates this year's exhibition; one or two are perhaps a little casual in treatment, and others tend to approach a photographic technique; but in all the paintings are as varied and as evocative as ever.

R. E. M.



NOCTURNE - SNOW GEESE
Keith Shackleton

GLOSTER JAVELINS OF

BLUE

BOMBER'S MOON

ELINS OF R.A.F. *Kenneth McDonough*

STORMY RETURN *C. W. E. Walker*

UE THE SKY

Harold Dent
MAXIMUM THRUST

QANTAS AIR LINER
Derek C. Morgan

Straight and Level

THE other evening I put on tails and went to the annual dinner of the Worshipful Company of Brochuremongers and Mock-up Makers. What a splendid occasion it always is (writes Straight and Level's special correspondent, from notes in chocolate sauce on the back of his menu).

The magnificent Buttonholers' Hall in the heart of the City of London forms a perfect setting for this—as we have already noted—splendid occasion; and as that great man of British aviation Sir John Blackout-Jones wittily said in his typically humorous speech, "a good time is always had by one and all." The speeches are always memorable, and are delivered with orchestral accompaniment by the Massed String Bands of the Brigade of Guards.

As already noted, the speeches are always memorable. A full report is not practicable, as the last speeches are still going on, but here are some notable highlights—all delivered by the various speakers with accustomed wit and in characteristic vein:—

Sir John Blackout-Jones (chairman, Scruggs Aircraft): "It gives me great pleasure *z-z-z-z-z drone drone z-z-z-z-z* . . . this memorable occasion *z-z-z-z-z* . . . great privilege *z-z-z-z-z* . . . my time is up *z-z-z-z-z* . . . longer ago than I care to remember *z-z-z-z-z drone drone z-z-z-z-z* . . . which reminds me of the story *z-z-z-z-z drone drone z-z-z-z-z* . . . and I am bound to say that I have complete confidence in the future progress and prosperity of British aviation. Thank you."

Mr Hugh Strangeways (Minister of Planes): "It gives me great pleasure *z-z-z-z-z drone drone z-z-z-z-z* . . . this memorable occasion *z-z-z-z-z* . . . great privilege *z-z-z-z-z* . . . my time is up *z-z-z-z-z* . . . longer ago than I care to remember *z-z-z-z-z drone drone z-z-z-z-z* . . . which reminds me of the story *z-z-z-z-z drone drone z-z-z-z-z* . . . and I am bound to say that I have complete confidence in the future progress and prosperity of British aviation. Thank you."

Sir Charles Boost (chairman, Plummet Air Lines): "It gives me great pleasure *z-z-z-z-z drone drone z-z-z-z-z* . . . this memorable occasion *z-z-z-z-z* . . . great privilege *z-z-z-z-z* . . .

● "I find that many Ceylonese make it a point to travel on other airlines rather than their own. . . . I consider it a civic duty for all Ceylonese to fly Air Ceylon." —Mr. P. B. G. Kalugalla, Minister for Transport and Works, Ceylon Government.

The point about the men employed by IATA to spy on member airlines suspected of undercutting fares is that they must be inconspicuous—like this Viking warrior who appeared at a SAS party on board a ship off Sweden last week. "Flight" photograph

● C-in-C Bomber Command, quoted in the *Daily Mail*, September 20: "Those of us who know the weapons we employ have no doubt at all—believe me, no doubt—it would be the end."

Director-General of Civil Defence, in the same issue of the same newspaper: ". . . to say that it must mean the end of the world is nonsense."

I couldn't wait to see next day's letters column in the *Mail*. I found it was largely devoted to a controversy about Gilbert Harding.

● Can you imagine the Ministry putting out a folksy Press release like this?

"When the Federal Aviation Agency holds its second Annual Fly-in for general aviation on October 1, visitors will be treated to . . . an old-fashioned outdoor dutch treat clambake in the traditional South Jersey manner . . ."

Perhaps the general aviation fraternity in this country doesn't want clambakes. But I'm sure it could do with some manifestations of official enthusiasm for its cause.

● "Looking ahead, if I had any money I would put it into international air transport."—Sir William Hildred, director general of the International Air Transport Association.

● Talking about jet noise, Sir William says that as it becomes familiar "it will fade into the background, behind the threshold of consciousness." He says that "it is a precedent condition of survival in a noisy, clattering world of today that there is a new noise which airlines are trying their best to keep within bounds and which is worth the public's while to live with."

Try saying that to the parents of a three-year-old boy who, as I happen to know very well, runs indoors terrorized every time a big jet takes off from the runway a mile or so from their house. And he has known this noise since the day he was born.

I do not know what the answer to the jet noise problem is. But it simply isn't good enough to tell people that they will get used to it, and that it is worth their while to live with it.

● Estimating that at the end of 1961 the airlines will have a substantial excess of capacity, the recent ICAO report on supersonic airliners says:

"This will no doubt be disposed of by speeding up the disposal of the less competitive piston-engined aircraft and by low utilization of the remainder, numbers of which will be held partially in reserve and utilized at times of peak demand and *when* [my italics] the newer aircraft are unexpectedly grounded."

For the word "when," I sincerely trust, we should read the word "if."

● "SKYBOLT SHOCK: Delay certain—it may be scrapped"—*Daily Mail*, September 17.

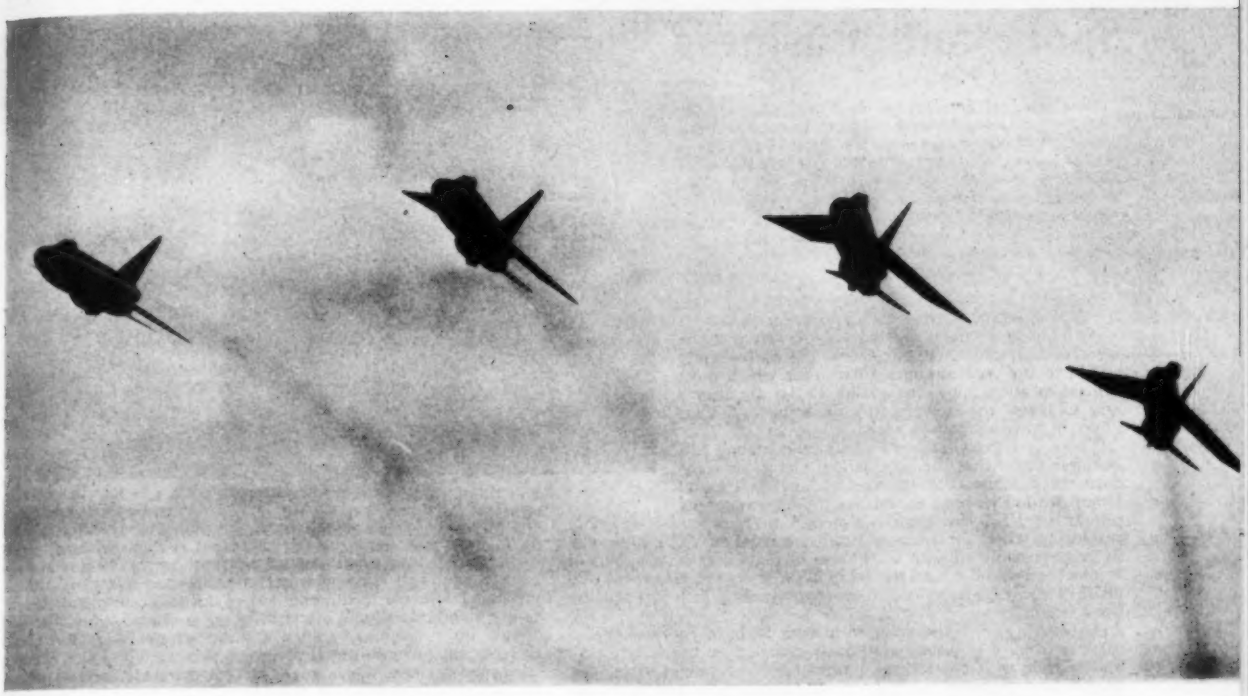
"SKYBOLT IS AHEAD OF SCHEDULE" — *Sunday Times*, September 18.

VVTOL

"The Hawker 1127 weighs five tons and has a thrust of about 10 times as much."—*Daily Telegraph.*

ROGER BACON

The other week I asked whether any reader knew of retired aircraft still rendering valuable services to the community. Here's the first reply: a DC-3 (slightly modified) used as a mobile home in Australia by Mr. Jeff Carter and family.



MANNOCK'S MEN

English Electric Lightning F.1 all-weather intercepters (two Rolls-Royce Avon 200 Series turbojets) of No 74 Squadron, RAF Fighter Command. This famous unit—the RAF's first Lightning squadron—was commanded during the 1914-18 War by Maj Edward ("Mick") Mannock, VC, whose total of 73 confirmed victories earned him the title "king of air fighters." The present CO is Sqn Ldr John Howe

"Flight" photographs

Sport and Business

Demonstrated at Farnborough by Ken Rutter was the Armstrong-Siddeley Cheetah-powered Lancashire Prospector. With 410 b.h.p. available for take off, initial rate of climb should be 1,200ft/min and cruising speed 140 m.p.h. at 4,000ft with a take-off to 50ft in 850ft. A similar conversion has already been undertaken in Australia and the Cheetah variant will now be available in the UK. Basic price will be less than that of the Lycoming powered version and engine overhaul life is 1,200 instead of 600hr. A fixed-pitch propeller is fitted

IS MORE RADIO navigation equipment in private aircraft going to make business and touring flying more, or less, safe? Are instruments and radio merely an aid to the type of contact flying for which most general aviation pilots are qualified? Or are they a lure to tempt the unwary to operate beyond their limits in instrument weather?

There is a growing body of opinion among US business pilots that the installation, almost as standard, of autopilots, 90-channel radios, ADFs and Omni in modern light aeroplanes provides potential pitfalls to VFR navigators—although nothing could be more reassuring when the weather begins to close in. The only way to become really efficient in the use of radio aids is to use them as much as possible, and the temptation is always present to rely on their availability to stretch prudent limits a little beyond the bounds of safety.

There is only one real solution to safer flight in poorer weather. That is to have sufficient equipment installed, to use it properly, and to train to fly within the limits of the equipment. In effect, this means obtaining an instrument rating, and every pilot who is seriously considering attempting to operate with regularity throughout the year might give serious thought to obtaining official approval to fly by instruments.

But whether, in the present scheme of things, this is a practical possibility for any normally busy man seems open to question. The requirements for an MoA Instrument Rating are 150hr as pilot-in-charge, of which at least 50hr should be cross-country experience; 20hr actual instrument flying of which 5hr should be completed shortly before the test; and 20 hours' procedure experience on a Link trainer. Armed with this experience, a PPL and an R/T licence, the private pilot who wants to obtain an instrument rating must take an MoA Link trainer test, an initial flying test and an instrument rating test. Technical tests have also to be passed on aviation law, flight planning, meteorology, signals and navigation. The full syllabus is set out in the 1959 edition of the Ministry of Aviation pamphlets CAP.53 and CAP.54.

It is hard to say how much spare time study all this would require, but it is obviously considerable. One authoritative estimate is that an intensive course devoted to the ground subjects alone would take four full weeks and that a part-time correspondence course, with as much spare time as possible given to home study, might take four to five months.

Viewed in the context of the pilot who operates an aircraft as transport in connection with his business, it seems that to all but a few the Ministry of Aviation instrument rating is out of reach. But the equipment to fly in instrument weather is not, so that in order to achieve effective standards of safety either limits must be placed on the conditions under which light aircraft may operate, or the instrument rating must in some way be modified so that the skills it confers are brought within more practical reach of pilots who are genuinely prepared to submit to the hard work and study that is involved.

While it is true that some steps have been taken to make it easier for a pilot to obtain an instrument rating in his own aircraft, the majority of the flying and ground tests are little altered. When suggestions for a simplification of the syllabus have previously been mooted there has in general been point-blank refusal to consider any modification of the standard. If the private pilot will not come to the rating, the rating is certainly not going to come to the pilot. It is not suggested here that the rating standards should necessarily be sacrificed, only that they should be re-examined to see if there are not ways and means of reducing to more practical proportions the long slog that the tests now demand. Or it might be that there are ways of making some type of limited rating possible—if not for regular flight along airways then to make more safe the occasional let-down through cloud in bad weather into the aerodromes best equipped to ensure a safe arrival. The number of occasions when this assistance would be required is likely to be relatively few, but it seems right that private pilots should press for more flexible thinking among those whose duty it is to lay down procedures and to award licences.

It is doubtful whether any private pilot really wants *safety* standards to be relaxed; but it does not necessarily follow that requirements set so high as to be virtually out of reach are the best way of ensuring overall safety. It would surely be better to raise the standard of instrument competence of the majority of private pilots with a rating of limited application than to restrict a full rating to the few who have time to spare to obtain it and can keep in practice when they have done so.

Arguments about the flying tests apart, one positive step that might be tried out now is to allow the technical ground tests to be taken with full reference to books and manuals. The argument here is that it is better to teach a pilot where to go for information than to train him to a high "swot standard" in procedures which may subsequently be forgotten and for which references will always subsequently be available.

PRIVATE FLYING in Great Britain urgently needs encouragement. One of the ways that this might best be done is to introduce follow-up flying training to standards higher than the private pilot's licence. Instrument training is one such step, and it might be worth considering the introduction of an intermediate type of private pilot's licence for which a qualification of, say, 100hr solo flying, 15hr Link and 5hr actual instrument flying was required.

What the privileges of such a licence should be are open to argument, but this would seem to be a reasonable qualification to demand of a pilot requesting a non-emergency special VFR clearance into an aerodrome within a control zone in IMC conditions. It should ensure a reasonable standard of competence on instruments should the weather deteriorate and should a GCA

This is the instrument panel of the 1961 Comanche, described on page 493 last week. Engine instruments are now on the right, leaving room in the centre for a typical radio installation of (top to bottom) Piper Auto-Nav ADF; Narco Mk V transmitter/receiver with VOR/ILS indicator on the left-hand panel; Narco Mk VI VOR receiver and the new AltiMatic three-axis autopilot. A second Narco Mk V for communications is installed on the left hand side of the panel. Extreme right, below the locker, are controls for the new cabin air system

be advisable. Proficiency in ground subjects should ensure that the pilot who is qualified under this scheme is aware of the functions and demands of the air traffic control system—without requiring to make use of them in anything except more or less exceptional circumstances. What one would like to see is an examination conducted on—and with reference to—the type of private pilot's manual which has been advocated on these pages before. There are encouraging signs that a manual of this type may become reality before very long; the aviation committee of the Royal Aero Club were to meet and discuss the Ministry of Aviation's new simplified *Light Aircraft Flight Guide* (see *Flight*, July 29, 1960) last Monday, September 26. Meanwhile every private pilot who feels that he has a responsibility for the safe conduct of a flight in Britain's crowded air might well decide for himself what he would like to see in such a manual.

In discussing light aircraft flight guides, *Flight* has, incidentally, been taken to task for apparently ignoring one or two of the very sound handbooks on flying training which are available, particularly H. H. Edwards' *Student and Private Pilot's Handbook*.* The point is that training and information primers are complementary to, not in conflict with, the idea of a flight guide. The latter is to be carried in aircraft and reference to it made for aerodrome information, radio frequencies, call signs, weather services, and so on. The flight guide is intended to take some of the guesswork out of cross-country flying and to digest for the off-airways pilot the information contained in *Air Pilot*. It is a matter for consternation that so few private pilots know their way about their official publication or are conversant with the regulations that it contains. The flight guide, while still giving more information than *United Kingdom Radio Facilities Charts*, is intended to be a semi-official short cut, for use in the air, to the relevant parts of *Air Pilot*. A. T. P.

Footnote: A question for all private pilots: Can you define, now, VFR and IFR flight? What difference, for instance, does 3,000ft a.m.s.l. (the QNH setting) make to the definition of VMC outside controlled airspace? The answer is in *Air Pilot*, RAC 11.

LESS THAN A YEAR from now the lease on Fair Oaks aerodrome is due to expire. Unless diligent steps are taken, by July 31, 1961, one more south of London airfield could be lost to private flying for ever.

Owned by the Air Ministry, Fair Oaks' 130 acres are leased to Universal Flying Services, the wholly owned subsidiary of Blackburn Aircraft which also operates Fair Oaks Aero Club. The company have applied for a 14-month extension of the lease and this is under consideration. But when it expires the aerodrome comes up for sale. Fair Oaks cannot be sold for continued use as an aerodrome because when Crown ownership is relinquished the site comes under the aegis of the Ministry of Town and Country Planning, and it would have to be re-scheduled for use as an aerodrome before flying could continue. On past form Bagshot Rural Council will presumably object to this and press for a reversion to green-belt farmland, as many local residents would welcome cessation of flying on the score of noise.

In the hangars which form the only really valuable fixed installations there are some 30 aircraft belonging to private owners, and there is no doubt that this is an aerodrome which has considerable potential for development along with British private flying. But money, equipment and above all security of tenure are urgently needed to freshen Fair Oaks' ageing face. Could there be a more urgent case for the sort of Government encouragement of aerodromes called for by Mr Masefield (see page 525) than here? Private flying may have to fight harder—and more successfully—than it did over Croydon if this busy south London airfield is to be retained.

THE CIVIL VERSION of the Bell HU-1 Iroquois helicopter, powered by a 1,100 s.h.p. Lycoming T-53L-9 turbine, is now to be offered for civil sale and will probably also be built under licence by Agusta in Italy and Mitsui Bussan Kaisha in Japan. The time at which the first aircraft become available and the speed of completion of civil certification will depend on the interest shown by prospective customers, but first 204Bs could be delivered at the end of next year and would cost $285,000 (about £102,000). The first public demonstration was to be at the National Business Aircraft Association annual meeting at Los Angeles on September 20.

More than 20,000 hours' flying have already been completed by US Army HU-1 Iroquois and the type has recently gained seven world records for time to height and speed and distance over various closed circuits and courses. The civil machine will be sold as a transport seating ten occupants, including the pilot, in rows of two, three and five. Alternatively a payload of 4,000lb could be carried internally or slung. Loads may project through the sliding side-doors and various cabin layouts could be arranged.

Bell claim that the 204B is the most conveniently sized machine of its capacity available and that it has handling characteristics which "come close to those of fixed-wing aircraft." Full power assistance with manual reversion is provided on cyclic, collective and rudder controls and the aircraft has been evaluated for all-weather flight by the US Army and approved for zero-zero take-off. The 204B is designed for simple maintenance without special tools and has eye-level sight gauges, built-in work platforms, standardized components and units grouped and fitted with quick disconnects. The complete engine or rotor hub can be changed in 20min and the transmission in 40min.

Principal data are: rotor diameter, 44ft; fuselage length, 39ft 7in; internal cargo volume, 140 cu ft; gross weight, 6,500lb (8,500lb as freighter); useful load, 2,182lb (4,182lb as freighter); empty weight, 4,318lb; max speed at sea level, 147 m.p.h.; cruising speed for range, at 6,000ft, 126 m.p.h.; max rate of climb, 2,660ft/min.

*Sir Isaac Pitman & Sons Ltd, London. Price 12s 6d.

First deliveries of Bell's new Model 204B helicopter (above) could be made "during late 1961." Civil version of the HU-1, the T-53 powered 204B may also be manufactured for sale in Europe under a licence agreement with Agusta of Milan. (Below) There is accommodation for a pilot and nine passengers (see col. 1)

RETROSPECT

From "Flight" of October 1, 1910

Flying at Brooklands: In connection with the annual race meeting of the Auto-Cycle Union, held at Brooklands last Saturday, a novel event was arranged in the shape of a race between a motor cycle and an aeroplane. The motor cyclist was F. A. McNab, mounted on his Trump motor cycle, and he had to cover four laps of the full course, while Blondeau, on Mrs Grace Bird's Farman biplane, was making five circuits of the aerodrome course—about an equivalent distance. Fine weather favoured the proceedings, which were watched by a large number of spectators. The aeroplane had a flying start, and completed one lap before the motor cyclist was given the word to go. After an exciting tussle, McNab won by 36sec. Subsequently some fine flying was seen by Blondeau, but he was surpassed by Graham Gilmour, who, taking Miss Bacon as a passenger on his Blériot machine, ascended to a height of about 1,000ft, and detoured over the surrounding country. Blondeau, at a height of 300ft, also ventured out beyond the bounds of the aerodrome. While these flights were going on the spectators on the ground were much interested in short flights by Macfie, on his biplane, and experiments by several other flyers.

All dressed up for the SBAC display in two shades of brown and black and white trim, the first D.6/180 looks attractive. Note the plastic spats, dorsal fin, large spinner and fairing housing the tailwheel damper oleo

AUSTER D.6/180 in the Air

By MARK LAMBERT

No 132 of the Series

SOME people swear by Austers; others swear at them. It depends on which of the many permutations of sub-types one knows and where one has tried to do what with them. I am in the annoying position of having hated every ordinary club Auster I have flown and liked each of the new variants the makers have asked me to fly—Agricola, Alpine, AOP.9 and, now, the D.6/180. The answer is, I think, that the very considerable improvements which Auster have introduced during the past four or five years have filtered very slowly through to the British clubs. The rough old Austers last so well.

If the luxurious, nosewheeled Atlantic of 1958 had to fall by the wayside, then the "D" series is a good way of attaining the same "executive" standard in a simpler way. The many permutations of wings, seats, engines and equipment offered in these new aircraft were described in the air test report of the first D.4 in *Flight* for May 6. The D.6 is the four seater and the D.6/180 has the Lycoming O-360 of 180 h.p., which gives a cruising speed marginally better than that of the Tri-Pacer.

The D.6 I flew, registered G-ARDJ, had a long (36ft) wing and a Macauley constant-speed propeller. With basic instruments and no radio it costs £4,335—cheaper than a Piper Caribbean, which has 30 h.p. less. Broadly, the D.6 is an Autocar, but it has the new engine, a cabin 2in wider, new instrument panel, cuffed struts, plastic wheel fairings, metal wing-spars, butyrate dope finish, the newer, improved control surfaces, a dorsal fin and, most welcome luxury furnishings, heater and Cessna-type air vents. The cabin geometry is about the same as that of the Autocar, as are controls, flap lever, trim handle, heel brakes and, particularly, the cabin doorway. G-ARDJ looked attractive in white and two shades of brown, with black cheat-lines. The cabin was carpeted and sumptuously cushioned and much trim lining had been added. I was the more disappointed to have to reacquaint myself with the mild gymnastics of climbing in, especially the hands-and-knees job of getting into the back seats over the folded front-seat backs.

Once installed I was very comfortable, but the engine cowling hid the ground ahead, the big liquid compass and its viewing mirror loomed in the windscreen and the wing root was so low that without bending down I could see only the inner halves of the wing struts. But Auster have not gone to the American lengths of blocking-in the roof and the clear plastic top surface was most useful both on the ground and in the air. Access and visibility could only be improved by a radical change in cabin configuration.

An excellent feature of the D.6 is its new, big, pale grey instrument panel with black coaming, affording plenty of room for flight instruments and radio. G-ARDJ had full flight-panel, Narco Mk V and VI radios and cigarette lighter (but smoking was still prohibited, pending re-routing of fuel lines). Switches and catches were neatly arranged and throttle plunger and pitch vernier control emerged beneath the middle of the panel. A complete break-away from Auster tradition the new panel really brightens up the cabin. The fuel-tank selecter was on the floor, well guarded and easy to operate; and the gauges for the two wing tanks were in the wing roots, clearly visible and apparently accurate to the last gallon.

The Auster bungee-sprung main undercarriage, with its sometimes annoying resilience, has been retained; but the quarter-leaf tailwheel spring is now damped by a hydraulic strut. Bounciness on the ground, particularly during the landing run, has been admirably reduced, but the main gear can still lead one a bit of a dance on rough ground during take-off. I found the heel brakes strong, sensitive and comfortable to use. The D.6 could be turned on one wheel with no difficulty and a spring connection between rudder and tailwheel greatly eased directional control while "free-wheeling." It was not powerful enough to overcome torque if the throttle was opened.

The Lycoming engine with its dynafocal mountings was smooth and quiet and noise level was at all times reasonable—a great deal lower than that in any other Auster I have flown. Conversation with slightly raised voices would be possible at climb power. I flew the D.6 unaccompanied, with 22gal of fuel and a quantity of luggage in the rear seats making a take-off weight of about 2,200lb. Empty and gross weights are respectively 1,498lb and 2,500lb.

Values I noted before take-off from a notice in the cabin were: VNE, 160 m.p.h.; VNO, 125 m.p.h.; climbing speed, 80 m.p.h.; maximum flap speed, 75 m.p.h.; "clean" stall, 49 m.p.h.; "dirty" stall, 38 m.p.h. Maximum r.p.m. were 2,700 and 72 per cent cruising power came at 24in and 2,450 r.p.m. Full throttle height was 5,000ft.

As I have remarked, taxying was pleasant, noise-level low and suspension good on rough ground, but forward and sideways visibility was below par. The standard RAF take-off check, as usual, covered all requirements and the roof window gave me a view of the approach before turning into wind. Immediately after application of full power, almost held on the brakes, the rudder became effective and there was no swing worth mentioning. The tail rose sluggishly and we began to bound along on the hard washboard undulations of Fair Oaks airfield. The D.6 bounced unhappily a number of times before finally deciding to leave the ground. Not wildly impressed with take-off behaviour, I was very pleased to see well over 1,000ft/min immediately registered on the v.s.i. as I climbed away at 80 m.p.h. The rather unbuoyant bouncing was, I think, purely the result of undamped undercarriage bungee: the ground run was very short and I timed it twice at 10sec to an unstick at about 50 m.p.h. A take-off with part flap (there are only two settings now) was much more definite, but occupied exactly the same time and about the same distance. I crossed the upwind boundary on the westerly run at 300ft each time. Take-off power was 2,700 r.p.m. and 28in, the r.p.m. having a slight tendency to overspeed at full throttle.

During the full-power climb the D.6 was pleasant to handle, but the propeller pitch control was very sluggish and the vernier feature consequently rather lost its usefulness. The few Macauley propellers I have encountered have all tended to be sluggish and hard to set precisely. Elevator trim, of the standard Auster pattern, operates in the unnatural sense, is too high geared and, in this case, deposited a layer of grease on my hand every time I used it. I have to read the quadrant label every time I use an Auster trim control; habit-forming is required.

Levelling off at 1,800ft a.s.l. with 24in and 2,450 r.p.m., I reached an i.a.s. of 133 m.p.h.—8 m.p.h. above placarded VNO. The D.6 was comfortable, forged along straight ahead and could be flown hands-off or with stick or rudder alone. Trim was difficult to adjust, but once settled seemed to stay reasonably well. Lateral stability was neutral, with no apparent control friction, and both pitch and directional displacements from trimmed cruise produced one firm phugoid, followed by a hesitation and a second, fainter, one. I timed the rate of roll from a steady 60° left bank to passing 60° right bank, using aileron alone, as 4sec—which

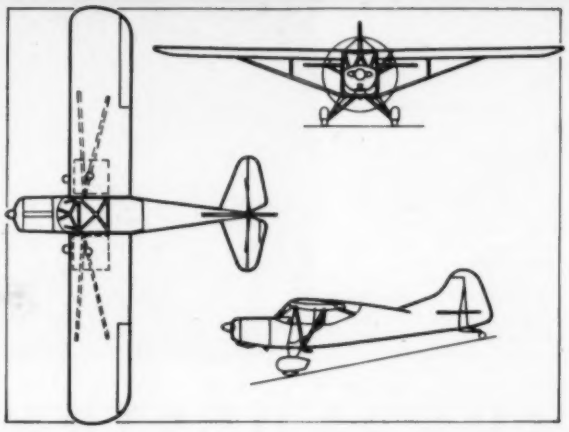
works out at 30°/sec. Because of the large dorsal fin and differential slotted ailerons there was much less adverse yaw when beginning the bank than with earlier Austers. Using full rudder as well, I banked 120° in 3.2sec, which means 37.5°/sec. Suspecting slow acceleration into the roll, I banked through 120° and timed the last 60° in 1.8sec—but this is slightly less than 37.5°/sec and denied slow acceleration. When I yawed with rudder alone, the nose fell quite sharply. When I let go completely in a bank, the D.6 wound up in a gradually tightening spiral to 150 m.p.h. and then recovered on its own by winding the other way into level flight. It paused and then began another spiral the other way, but I did not wait this one out. Closing the throttle, hands-off, resulted in a fairly rapid entry into a dive. Effect of change of power on longitudinal trim was fairly marked. The rudder was the heaviest of the controls, but the forces in general were pleasantly light.

Trimmed at 70 m.p.h., lowering of flap caused a firm nose-down change with the first setting and less with the landing setting. Changes were reversed with raising of flap and speed increased very rapidly. There was only slight sink. Application of full power in a full-flap trimmed glide raised the nose rapidly, but the D.6 could be trimmed out and climbed at 450ft/min indicated. With full flap and power off at 65 m.p.h. the rate of descent was 1,000ft/min, making a very useful gradient. Propeller fine-pitch with the throttle closed provided a good quota of drag for steep approaches. With flaps down, stability and stick forces remained largely unaltered and I timed the rate of roll from a steady 45° left bank to passing 45° right bank at 2.2sec, using both aileron and rudder—41°/sec and perfectly adequate for landing.

Trying the clean stall, I throttled back and held the v.s.i. at zero. Angle of attack and stick-back movement increased steadily down to 60 m.p.h. and much more rapidly thereafter. The D.6 clawed at the air, juddered firmly for an instant at 40 m.p.h. and then broke cleanly into a dive and immediately returned to 50 m.p.h. With the stick still held hard back, the aircraft then tried to stall again and went sedately downstairs. During several stalls the right wing went down about 30°, quite innocuously; but aileron remained usable, because the speed returned so quickly after the nose dropped. In a power-off stall with flap, the process was simply emphasized; the break was sharper and we went jerkily downstairs. Descent was 1,000ft/min indicated and aileron control remained.

There seemed to be insufficient elevator to stall easily out of a 30° gliding turn. I flew with full control at 30 m.p.h. with a good deal of power and flap down and then cut power and glided at 35 m.p.h. The change in stick-back position was marked in the transition between these two states, as it had been when passing below 60 m.p.h. while approaching the 1g stall. I noticed this characteristic during several landings after power-on approaches. Elevator trim ran out at 60 m.p.h. in a power-off glide with full flap.

Having now lost some height, I timed the climb at full power and 80 m.p.h. from 1,500ft to 2,500ft. It came out at 50sec, making 1,200ft/min—exactly what the v.s.i. had told me. So I returned to the circuit with a fair idea that the approach would be steep and could be made at about 65 m.p.h.; that stick movement during the round-out would be pretty rapid; but that there would be no particular problems except those associated with visibility in the turn. On the descent, the roof window gave very useful inward visibility in a turn, but in a climbing turn the airfield was lost from view. I flew downwind at 80 m.p.h., made the few necessary checks and left flap up until the base leg.



Of three approaches, the first two were power-on, cutting during the round-out and having to snatch the stick back after slipstream effect left the elevator. The ensuing touchdown was a little groping and once I bounced, partly because visibility sharply decreased as the nose came up. The tailwheel had a markedly good effect in damping the bouncing tendency and the tail stayed down nicely. The ground-run was short and simple and I could find enough brake to lift the tail (unintentionally) at the end of the landing run. The last landing, made carefully from a final glide, was simplest and cleanest of the three. I once tried to side-slip, but there was not enough rudder to develop any great slip, although the rate of descent increased perceptibly.

A condensed opinion on the D.6 is difficult to formulate, but I could put it as follows. If someone gave me the D.6 to fly as a completely strange, nameless aircraft, I would not be greatly impressed by its handling qualities, which are safe but unexciting; but I would recommend it for its straightforward simplicity and for its comfortable seating, good equipment and powerplant. Knowing something of its predecessors, I would warmly congratulate Auster on this really big step forward into the executive field. But the legacy of the dark days is still too evident in features like trim control, the shape and size of the door, and the bungee undercarriage. I would be quite happy with the tailwheel undercarriage if it did not carry quite such penalties in forward visibility. Several more inches' head-room beneath the wing and a correspondingly higher door and seating level would probably do the trick. Everyone clamours for a nosewheel, but I think what they really want is visibility and steering. A slightly stronger spring connection between tailwheel and rudder would give quite adequate directional control and a higher cabin would improve the view. But, whatever the criticisms, the D.6 is hard to beat in value for money—a point one is apt to overlook in an air test.

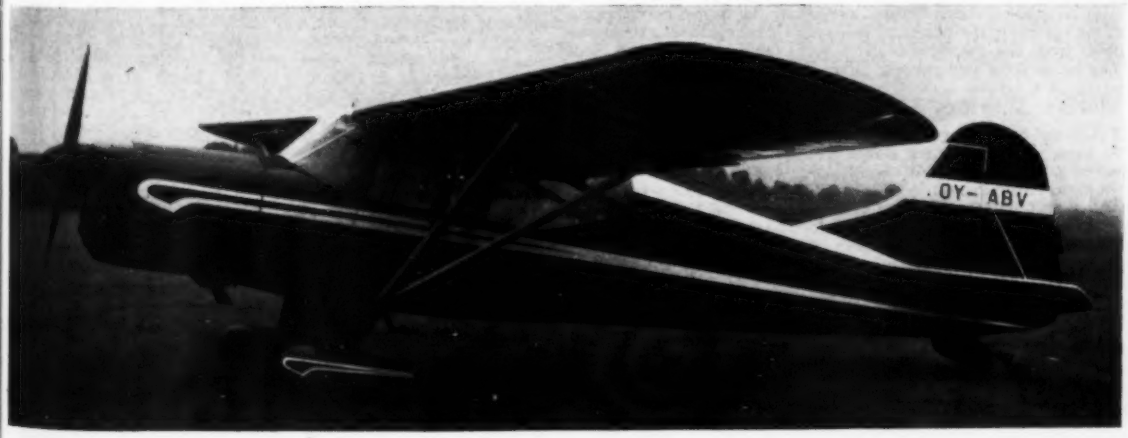
AUSTER D.6/180

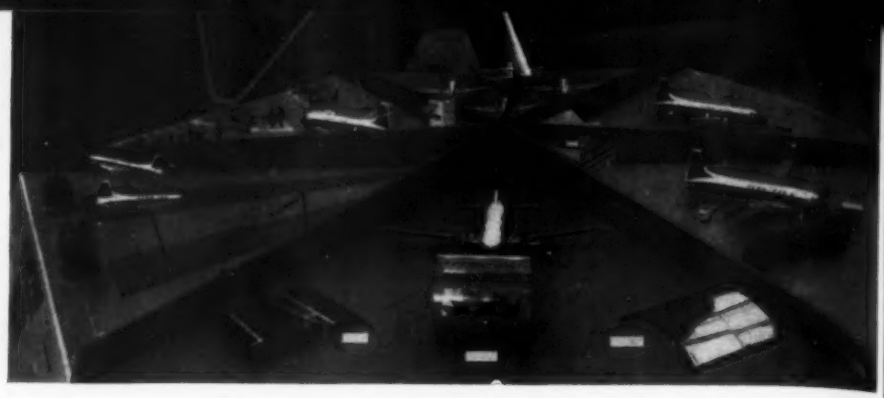
One Lycoming O-360 giving 180 h.p.

Dimensions: span, 36ft; length, 23ft 2in; empty weight, 1,450lb; gross weight, 2,500lb; disposable load, 1,000lb; payload, with fuel for about 1hr, 750lb; wing loading, 13.55lb/sq ft; power loading, 15.9lb/h.p.

Performance (figures in brackets for typical lightly loaded weight of 1,750lb), take-off run, 690ft (390ft); take-off to 50ft, 1,680ft (960ft); initial rate of climb: 850ft/min (1,350ft/min); max speed at sea level, 138 m.p.h. (141 m.p.h.); max cruising speed at 5,000ft, 133 m.p.h. (137 m.p.h.); range at max cruise speed, 490 miles; stalling speed, flaps down, 35 m.p.h. (30 m.p.h.).

A more standard paint scheme on a D.6/160 with the 160 h.p. Lycoming engine. Choice of colours is apple green, poppy red, French blue, light orange, smoke grey, dove grey, black or white. On this aircraft there are no cuffs on the root of the struts





This display at the SBAC Exhibition — illustrating some of the roles of the Avro 748, and showing cut-away components in miniature—was the work of Mastermodels Ltd, of Greenhill Crescent, Harrow, Middx. The company claims to have been responsible for the biggest share of models in the show

THE INDUSTRY

Northern Aluminium Change Name

THE Northern Aluminium Co Ltd, of Banbury, Oxon, has changed its name to Alcan Industries Ltd. The alteration, it is stated, involves no change of ownership, manufacturing activity or sales policy; it is simply to identify the company clearly with Aluminium Ltd of Canada ("Alcan"), whose output of aluminium accounts for about one-fifth of the Free World's primary production of this material.

The old-established name "Northern Aluminium" has sometimes puzzled people who know that the company has no plants farther north than Birmingham. In fact, it was the original name of the parent company when first established in Canada at the beginning of the century; it was used by what was then the British sales office, and has survived here until now. Over the years, the products of the UK company have become well known under the "Noral" trademark, and Alcan Industries Ltd do not intend to abandon this identification.

Noise-excluding Helmet

VTOL aircraft may raise particularly acute problems of noise, not only for people on the ground but for the pilots themselves. As SBAC Show visitors who watched the Short SC.1 will remember, the noise is likely to be at maximum intensity during the take-off and hover phases—moments during which a test pilot may particularly want to use his R/T or a tape recorder.

With this in mind, M.L. Aviation Co Ltd, of White Waltham, Berks, have designed the noise-excluding helmet illustrated here; it was, in fact, tailored specially for Tom Brooke-Smith to use during his testing of the SC.1. The makers also have helicopter cockpits, carrier flight-decks and engine test-beds in mind as other places in which it would be of value.

Although ostensibly little more than a well-padded "bone-dome," the M.L. helmet is the result of a considerable amount of experiment with sound-reflecting and sound-absorbing materials. The shape and thickness of the padding, and the design of the visor and the earphone "buns," are among the factors contributing to the success of the design. The oxygen mask excludes extraneous noise from the microphone, and, with the supply disconnected, may be used for this purpose alone.

Morfax Activities

FOR the past four years Morfax Ltd, of Willow Lane, Mitcham, Surrey, have provided a free maintenance service for aircraft participating in the SBAC Show, using one of their mobile workshops for the purpose. Last year they effected repairs to a helicopter on four days, and this year their principal "customer" was another helicopter, which had developed exhaust-duct cracks that would have prevented its appearance in the flying display.

The company, incidentally, has just produced two well illustrated and informative publications. One deals with the full range of Morfax ground servicing equipment, the majority of the items of which (e.g., engine and propeller assembly and maintenance stands and undercarriage-leg installation rigs) are approved by the manufacturers concerned. The other, a "schedule of major plant and services," illustrates in considerable detail the plant which the company has available for development work, precision machining, welding and sheet-metal work, and other activities. The arrangement of the brochure allows the customer to see at a glance the largest and smallest capacities available for any particular type of work.

Control panel of the Zwicky Severn 10,000gal refueller, sketched by a "Flight" artist at Farnborough. (1) Fuel/de-fuel valve. (2) Gallon counter. (3) Gal/litres per minute. (4) Suction valve. (5) Throttle. (6) Hose-reel stop. (7) De-fuel valve. (8) Hose-reel rewind. (9) Earthing wire. (10) Instrument panel: pump pressure/vacuum, hydraulic pressure, hose end pressures, control pressure setting, filter differential pressure, pump speed. (11) Fire extinguisher

IN BRIEF

Redifon Ltd announce the establishment of an American company, Redifon Inc, at 5265 Watson Street NW, Washington DC (KELLogg 7-1558).

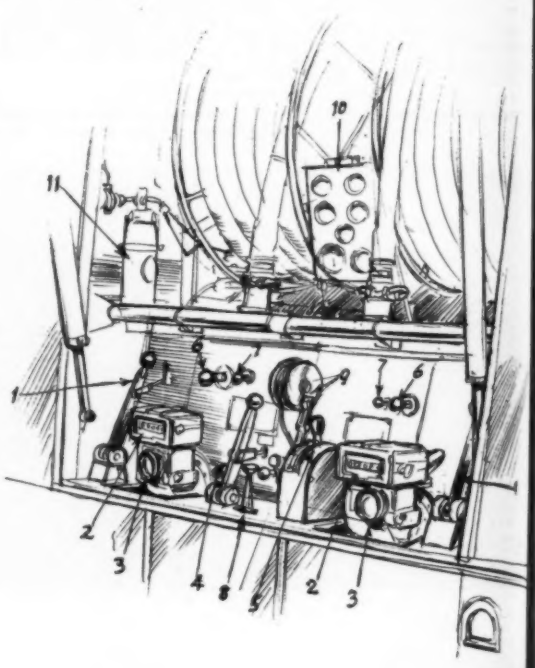
Aerofilms Ltd and Aero Pictorial Ltd, both specialists in aerial photography, have amalgamated under the title Aerofilms and Aero Pictorial Ltd. The head office is at 6 Elstree Way, Boreham Wood, Herts, and the picture library at 4 Albemarle Street, London W1.

Dr T. W. Straker, MSc, PhD, has been appointed deputy manager of the Marconi Company's Radar Division, of which Mr E. N. Elford, OBE, AMIEE, is manager. Dr Straker, who joined the company in 1957, was formerly engaged on electronic air-defence work for the Canadian Government.

Mr F. A. B. Gaire, who joined Handley Page Ltd in 1957 after 34 years in the RAF, has been appointed as their education and training officer. At the Cricklewood and Radlett works Mr A. Winstanley and Mr W. H. Cooper, respectively, have been appointed apprentice supervisors.

The Goodyear Tyre & Rubber Co (Gt Britain) Ltd have announced the appointment of Mr J. L. Mumby as financial director and secretary. He succeeds Mr W. R. Booth, who has returned to the US as an assistant treasurer of the parent Goodyear Tire & Rubber Co.

Joseph Lucas (Gas Turbine Equipment) Ltd ask us to state that information recently issued concerning their M.40 high-speed hydraulic motor (illustrated in *Flight* for September 2) should have made it clear that the weight of the motor is actually 11lb 10oz. Recent development has pared 2oz off the weight of this 4,000lb/sq in unit, which delivers 40gal/hr per 1,000 r.p.m. and operates at up to 25,000 r.p.m.



CORRESPONDENCE

The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns. The names and addresses of the writers, not for publication in detail, must in all cases accompany letters.

Long Time No "C"

Why BEA has dropped its C
I fear is quite a question.
Is CAA C.A.A.C.
*At Mr Fox's suggestion?**

A.N.A.C., not TAA
Would give the right inflexion;
T.A.L.C. for TCA,
To better its complexion.

But please, no more B.E.A.C.
Just BEA will do.
We've made short-haul air transport pay
And made it cheaper, too.

A body that can do all that
In working for the nation
Has surely shed sufficient "fat"
To lose its Corporation.

Ruislip, Middx PETER W. BROOKS,
Technical Assistant to Chairman, BEA

**See letter from Mr D. K. Fox in "Flight" of September 9.*

Coanda's 1910 Jet Experiments

SOME time ago, Fritz von Opel's 1929 flight in a solid-propellant rocket aircraft was quoted as the first jet-powered flight by a man. It seems that the first jet flight could well be that claimed by Henri Coanda in December 1910. He built what might be termed a "piston fan jet"-powered biplane, in which a piston engine drove a ducted fan, the air impelled by which was mixed with fuel and, with the piston engine's exhaust gases, producing a jet stream. Coanda says he lifted the machine off the ground, but at too high an angle; the wing heeled over and he could not control the aircraft. He injected more fuel into the turbine, but this set the aircraft on fire; he cut off the fuel, the biplane stalled, and Coanda was thrown clear of the machine as it fell to the ground.

If this is a true account of what happened, the half-centenary of the first flight by a jet powered aircraft will fall in December this year. Coanda appears to have made a large number of other brilliant inventions, and is now working on a 500km/hr "flying saucer" to sell at the price of a medium-priced car.

Croydon, Surrey T. R. SERVIAN

Cross-Channel Ballooning

AS was to be expected, the recent balloon crossing of the Channel gave rise to considerable telephone querying here.

Our first intimation that such an event was taking place was a telephone call from a journalist on the South Coast on the morning of the take-off. He wanted to know when the Channel was last crossed by a balloon. Not keeping this sort of thing on my scratch-pad I started to look back through the volumes of your excellent journal and after a full morning of index-searching I came to the conclusion that the last time the crossing was made was reported in *Flight* on December 19, 1935, when one of 11 balloons from Gelsenkirchen landed at South Cockerington. In the Gordon Bennett Balloon Race in September 1933 a team from Dusseldorf landed at Berwick-on-Tweed (*Flight*, September 28). On February 14, 1929, you, Sir, reported that a balloon which had ascended from Bitterfeld "last Sunday morning" was beset by a storm during an inland cruise and finished up near Aberdeen under the impression that it was in the Netherlands.

Perhaps all of these may be dismissed as involuntary and as being over the North Sea; but I think a crossing mentioned in your issue of June 25, 1925, fills the cross-Channel requirements. Mrs John Dunville, accompanied by Capt M. Dunville (her son) and Cdr Baldwin made an ascent in the balloon *Banshee III* from the Welsh Harp, Hendon, at 1 a.m. on June 21 and landed near the Belgian frontier later that morning. This also clears up any queries about the last woman, the last mother, the last mother with her son, the last night trip, the last night trip by a woman and so on *ad nauseam*.

I hope I am right but I am quite ready (and willing) to be corrected. It certainly seems to be later than the crossing quoted by some reporters—that of 1913, when the Gordon Bennett Balloon Race competitors, aiming at Geneva, managed in one case to land near Bridlington, having started from the Tuileries. As a matter of interest, one of the competitors in that race was a Mr John Dunville in *Banshee*.

London W1 F. H. SMITH,
Librarian, the Royal Aeronautical Society

A Rain of Farthings

From AVM Sir John W. Cordingley, KCB, CBE, RAF(Retd).

YOU were kind enough to print my appeal to your readers to send unwanted farthings, now obsolete in our currency, to help this Fund. Your readers may now like to know that already we have received over 13,000 farthings. Bearing in mind the high cost of postage and stationery, and since many were sent anonymously, I should like to take this, my only opportunity, to thank all who have turned out their cupboards in this helpful way.

Not all your readers sent farthings. Silver threepenny bits and other coins helped to produce a total of nearly £50. One postal order was accompanied solely by the message "With love." A reader who had no farthings sent £1, representing 960 farthings, following it up later with a cheque for a further £4. I was particularly touched by his regard for the RAF, since he described himself as "an old horse soldier of World War I."

Incidentally, among coins received were several minted in the reigns of George II, George III and George IV.

Every little helps, and the farthings will soon be doing good work for relief of distress among serving and ex-Service members of the RAF, WRAF, their families and dependants.

London W1 JOHN W. CORDINGLEY,
Controller, RAF Benevolent Fund

Australian Industry and the RAAF

IN regard to Mr D. C. Clayton's letter in the July 22 issue concerning Australian aircraft production: The facts are that the Australian aircraft industry supplied 3,500 aircraft to the RAAF in 1939-45, and 2,850 engines. Without Australian-built Tiger Moths, Wackett Trainers and Wirraways the RAAF could not have been trained for Pacific operations and the EATS system in Australia simply could not have operated at all. That is history—I have read Herington and Odgers several times. The Beaverbrook cable of 1940 and the subsequent allocations of UK-US aircraft to other theatres starved the RAAF—but in this connection I was referring to the Pacific. Of course the RAAF got aircraft to fight in RAF squadrons, or for the EATS squadrons formed by the RAAF for the German-Italian campaigns. But the Pacific War was another matter.

Vengeances and Liberators are mentioned in Mr Clayton's letter. The RAAF got Vengeances because an Australian Cabinet Minister was given them in Washington and did not realize they were of no use in New Guinea. Mr Odgers' volume of the RAAF Official History distinctly says that most of the hundreds of Vengeances were not used operationally and were actually withdrawn on General MacArthur's personal orders. The RAAF in the Pacific got Liberators only when they were replaced in the USAAF as heavy bombers by the B-29.

The RAAF in the Pacific was never given first-line, first-rate operational aircraft throughout the war—unless the Kittyhawk could be so described in 1942-43. The RAAF's Mustangs were not in operation until the very last weeks of the Pacific War.

In 1942-43 the RAAF simply could not have fought in New Guinea at all without home-grown Beauforts, Beaufighters, Wirraways and Boomerangs. There was nothing else to fight with except some Hudsons.

In other words, the RAAF was given weapons when it was fighting in Europe and Africa, but not to defend its own shores. The lesson thus learned is very deep in the Australian consciousness, and most vividly in the minds of all RAAF senior officers today, who saw this at first hand.

Melbourne STANLEY BROGDEN

Living Near London Airport

AS a long-suffering resident of south-west Middlesex I should like to take Mr Estill to task about his remarks [Correspondence, September 16] concerning the price of property near London Airport.

Local inhabitants are not trying to profit from a rise in the price of their property, nor are they trying to throttle the growth of London Airport as a world centre. All they want is peace and quiet. Most of us were born in this area long before LAP came into existence and, strange as it may seem, most of us like it here! Why should we move just because of short-sighted planning in the building of an international airport in a heavily populated fog-zone?

One shudders to think what might happen if one of the big jets goes the same way as the unfortunate Viking in Southall.

CORRESPONDENCE . . .

With regard to the price of property I should like to point out that it is largely demand by the employees of the airport that is causing the rise, and not profiteering locals.

I wish Mr Estill luck with his search and hope that he finds a house at Cranford or Stanwell, well within reach of the nocturnal rumblings of the Boeing 707!

Ashford, Middx — L. S. CARTER

Spares Service

I FOUND the proposals in your series "Support and Sell" very interesting. They are, however, I suggest, open to a number of objections.

There is no evidence—at least of which I am aware—to support the idea that the RAF system of maintenance units is suited to the distribution of aircraft parts. A contrary opinion is held by some. Even if the system were suited to the distribution of parts for military aircraft, it would not follow that it is suitable for commercial operators. Further, the cost in terms of stocks, staff and space of area distribution centres "able to provide anything from a crash-kit to a split pin from any manufacturer on demand over-the-counter" would be very great indeed in relation to their sales. Consequently, operators would have to pay a considerable mark-up (I would guess 50 per cent at least) on all purchases in order to support these centres alone. Then, airlines sell air freight space as a means of dispensing with "area distribution centres." They would be weakening their own sales efforts if they did not practise what they preached.

There might be a case for an organization in UK to facilitate the supply of spares from small manufacturers to small operators. The large manufacturers and the large operators should need no assistance.

Finally, "Accent on the Unexpected" in your issue of August 19 contains the statement that "Rolls-Royce still have no betters at parts supply." Without wishing to imply any criticism of Rolls-Royce, it would be interesting to know the basis for this statement.

Valois, PQ, Canada — E. G. FARTHING

I WAS very interested to read Mr C. G. Scott's article "Accent on the Unexpected" in the issue of *Flight* dated August 19, dealing with the problem of which we are very conscious.

I was, however, sorry not to see some mention of the Marconi Company's contribution towards the solution of this problem. For the past eight years we have been operating a spares and servicing organization based at Croydon Airport where we carry a large stock of breakdown spares for equipment of our manufacture, and we endeavour to give users of this equipment a rapid service.

This organization is shortly to be transferred to a new extension to our Basildon establishment, where all the aeronautical activities of the company will be concentrated.

Also, in 1955, we opened a servicing organization at London Airport for the convenience of users of our equipment operating from this point. At the end of last year this was moved to larger accommodation in No 1 Maintenance Area, from which we provide complete overhaul facilities for all our equipment. We achieve a quick turn-round and in an emergency we can offer 24-hour service. It is quite obvious from the volume of work being handled at London Airport that this service is greatly appreciated by users of our equipment.

Chelmsford, Essex — MARCONI'S WIRELESS TELEGRAPH CO LTD, B. J. O'Kane, Manager, Aeronautical Division

BPB: Army Officer Raps Strangeways

WHILST Mr Hugh Strangeways' selection of five revered names in British industry for part-time membership of the British Planes Board ("Straight and Level," August 26, 1960) is to be commended, I feel that certain matters have been overlooked.

The most glaring of these, of course, is the selection of Sir John Feckless. Quite obviously Mr Strangeways must be unaware that Sir John's tenure of office as Minister of Football was characterized by much advocacy of the superiority of the Association round-ball (as compared with the oval-ball) game. This, I feel, makes him quite unsuitable for a post with the British Planes Board, carrying as it does such wide responsibilities to Queen and Commonwealth.

I will not labour this particular point further. But there are others. Snoring-Smith's company built cigarette lighter attachments for World War 2 bombers; Beat's Wobble Board Music Industries was responsible for the development of Automatic Blind Vamping; Cardboard was once suspended from the Slothley Bowls Club for throwing (whilst absent-mindedly watching a Tiger Moth land on the club house). These activities, demonstrating as they do a past association with aeroplanes, are, I submit, DANGEROUS TENDENCIES, unworthy of future members of the BPB, however part their time.

Dr J. Nit, of course, is well-known and my remarks above do not apply to this excellent choice.

I do not wish to be entirely destructive in my criticisms. Knowing that many would like to see younger blood injected into the BPB, why, therefore, did not Strangeways include obvious names which spring to mind, such as

General "Tubby" Golightly, DSO, MC. Joined Army as subaltern, 1898; Relief of Mafeking; retired 1914. Premier award, Crufts, 1922. Aged 80.

Brigadier "Blood-and-Guts" Carruthers, DSO, MC. OC 11th Platoon, 4th Foot and Mouth Regt, in their famous march from Dover to Calais. Inventor of the submarine. Aged 76.

Maj Gen "Shorty" Flagstaff, DSO, MC. Seconded to Colonial Office and held post of Governor-General of Wei-Hai-Wei 1903-1958. Now AWOL. Aged 78.

These men, Sir, are of high quality. Their services will not be given without due recompense and competition is keen. All are known to be in the running for Editor-in-Chief, SBAC Farnborough 1960 Catalogue (2s 6d)—a post which carries with it the sort of rewarding responsibility to which they have always been accustomed.

But we must try. Frankly, Strangeways' list seems to have been compiled by going through *Who's Who* with a pin.

With the British Forces in Patagonia — DISGUSTED (LT-COL)

That NZ Delivery

SINCE I was the writer of the advertisement which caused such interest and such a furore of denial as to its veracity, I feel that your correspondents should not go unanswered, since I still believe my claim to have been correct—though remain only too willing to apologize if proved wrong.

The whole point of the advertisement, obviously lost upon your correspondents and therefore clearly badly made by yours truly, was that the sale of the Apache was conditional upon its safe delivery *by us* to Christchurch, New Zealand; in each case cited by Mr W. S. Shackleton and others the aircraft was purchased in UK and flown *by the purchaser or his nominee* to New Zealand. In our case, while the sale of the Apache was negotiated and agreed while the aircraft was still in UK, it was not completed, nor were we paid a single penny until we delivered the aircraft safely to New Zealand.

I apologize for not making this clear in the advertisement, and wonder whether it is still not a unique sale flight.

London SW1 — R. K. DUNDAS LTD, P. J. Phillips, Aviation Manager

The Virginia's Power

I HAVE been expecting that someone would rush to correct the statement in Maurice Austin's letter published in *Flight* of August 19, in which he referred to "Rolls-Royce Condor" engines fitted in Vickers Virginias. Since no one seems to have offered any comment on this statement I feel it should be pointed out, in the interests of historical accuracy, that the Vickers Virginia was fitted with Napier Lion engines.

Farnham, Surrey — R. N. BELL

[Perfectly correct, of course; but a few had the Jupiter or Pegasus.—Ed.]

FORTHCOMING EVENTS

Sept. 26-Oct. 1. AGARD Structures and Materials Panel Meeting, Athens.
Oct. 1. British Interplanetary Society: "The NASA Spaceflight Programme," by Morton J. Stoller.
Oct. 3. Society of Instrument Technology (Cheltenham Section): "Hydraulic Servo Systems," by Prof E. B. Pearson.
Oct. 3-7. AGARD meetings (including 10th General Assembly), Istanbul.
Oct. 5. RAeS Weybridge Branch: "Are Aircraft Electrics too Complicated?", by H. Zeffert.
Oct. 6-7. BritIRE (South Western Section): Convention on "Aviation Electronics and its Industrial Applications."
Oct. 7-8. British Institution of Radio Engineers: Aircraft Electronics Convention, Bristol.
Oct. 8-9 FAI Rally, Barcelona.
Oct. 11. RAeS (Luton Branch): Film Evening.
Oct. 11-12. Aerodrome Owners' Association: Annual Conference, Folkestone.
Oct. 12. Kronfeld Club: "Flying with the Fuchs Antarctic Expedition," by Sqn Ldr J. Lewis.
Oct. 12. RAeS (London Airport Branch): "The VC10," by Hugh Hemsley.
Oct. 13. Society of Instrument Technology (London): "Transistor Switches in Monitor and Control Systems," by W. A. Ross.
Oct. 17-18. Institute of the Aeronautical Sciences and Canadian Aeronautical Institute: Joint meeting, Montreal.
Oct. 18-19. Guild of Air Pilots and Air Navigators: Third Air Traffic Control Convention.
Oct. 19. Kronfeld Club: Annual General Meeting.
Oct. 19. RAeS Southend Branch: "Rocket Engines," by L. S. Snell.
Oct. 25. Society of Instrument Technology (London): "Instrumentation, Past Present and Future," by L. S. Yoxall.
Oct. 26. RAeS Weybridge Branch: Film Show.

AIR COMMERCE

From October 4 Pakistan International Airlines' international services will be operated by Boeing 707s under an extension of the arrangement with PanAm. The L.1049s previously used on this service will now be used between East and West Pakistan. On the eve of the all-jet international service, PIA's managing director, Air Cdre Nur Khan, was in London. Here he is greeted outside the airline's Piccadilly office by Mr M. K. Janjua, the London manager

JET NOISE AND PROPERTY

A FORETASTE of the noise nuisance that supersonic airliners will constitute is provided in the Building Research Board's report for 1959. Complaints of vibration damage from low-flying aircraft continue to reach the Building Research Station, which is investigating the problem. Measurements of the movement of a house floor when an aircraft (type unstated) flew close overhead disclosed vibration of a vertical amplitude of 0.002in at a frequency of about 15c/s. By comparison, a villa by the side of a main road subject to vibration caused by heavy tanks frequently using the road suffered a maximum vertical vibration of the floor of less than 0.001in.

The board has inspected some houses near runways over which jets have flown directly at high speed and altitudes of frequently less than 100ft. Damage caused has been limited to the reappearance of repaired cracks in ceilings and the possible slipping of an occasional slate, and the board's report considered that noise is more troublesome. Fewer inspections of property alleged to be damaged by sonic bangs have been made than in previous years, and any damage that might have been caused by the bang was of a very minor nature. The board has not yet been asked to undertake any research into the likely effects of supersonic airliner noise on property, presumably because these effects, and the degree of silencing that manufacturers will be able to achieve, are still very much a matter of conjecture.

The Building Research Station first became concerned with sound propagation in the open air in 1952 when the LCC asked it to advise on noise problems associated with a London heliport, but such advice was difficult to give because little was known about the noise output of future helicopters and less about the noise levels that could be tolerated in buildings, or about how the sound was propagated. Since then, considerable progress has been made, techniques of noise recording and analysis have improved, more is known about sound propagation and several criteria have been worked out for permissible noise levels in various types of buildings. Current investigations deal with sound propagation from an aircraft on the ground to other places on the ground. A Swift FR.5 is used as a noise source, and the variation of sound pressure with distance is measured using nine microphones spaced over a line about a mile long. Wind and temperature are also measured.

LESSONS OF A LANDING FIRE

THE BEA Viscount 802 which caught fire on the runway at London Airport on January 7 after the nosewheel collapsed backwards, crossed the threshold into visibility officially classified as between "thick fog" and "dense fog." The aircraft travelled for 500yd with its nose rubbing the runway and fire broke out in the forward hold above the nosewheels. A fracture of the main hydraulic pipes feeding the steering jacks resulted in hydraulic oil at high temperature and pressure being sprayed on to the tyres and baggage. The escape of this oil is considered in the report* on the accident to be a prime factor in the fire, which destroyed the fuselage. There were no casualties.

The opinion of the Deputy Chief Inspector of Accidents, Mr J. W. Duggan, is that the accident was caused by failure of ATC to notify the captain of a critical deterioration in runway visual range during his final approach. With insufficient visual reference for a landing, the nose gear contacted the runway first and fractured its attachment. The time was then 1922½hr.

All that day visibility had been poor. Capt E. S. Linstead, captain of the Viscount, was passed the RVR on runway 28L at 1829hr while he was en route from Dublin. It was then 700yd. Two minutes before the descent was started over Bristol, at 1858hr, the same figure was passed again. At 1910hr RVR was given as 400yd and at 1914, when London Director radar took over, again 400yd.

Four minutes later, London Director said "The visibility seems to be dropping, I'll give you a short turn on." London Precision took over two miles from touchdown and guided the aircraft to within sight of the approach lights—which the captain could see from about three-quarters of a mile away—and then to within half a mile of touchdown. At the specified critical height of 250ft and as he crossed the threshold the captain was confident that he had more than the BEA minimum visibility of 400yd. But RVR, as measured by the runway controller, had in fact deteriorated to 250yd at 1920hr, 100yd at 1922hr and "less than 100yd" at 1923hr.

In January, the procedure for passing RVR to approach control was by telephone from the runway controller to the air controller and from him by telephone to the approach controller, who broadcast it on the frequency in use. The last RVR passed to the aircraft was 400yd at 1915hr; the deterioration to 250yd at 1920hr —logged by the runway and air controllers—did not appear on the approach controller's RVR form and was not passed to the aircraft. In evidence, No 1 director said he was going to pass the 100yd observation received at 1922hr to the precision controller but as the latter was then giving final instructions he decided not to interrupt. On completion of the talk-down he considered it was then too late to influence the pilot's decision to land.

An observation of the Deputy Chief Inspector of Accidents is that failure to pass the 250yd deterioration to the aircraft was "the prime cause of the accident," but because of conflicting evidence of the ATC officers the source of the failure could not be ascertained. "It must be borne in mind," the report adds, "that the last-minute decision would not have been forced upon [No 1 director] if the 250yd deterioration two minutes earlier had been passed to the aircraft."

In November 1958, the airport authorities submitted a proposal for the installation of an improved system for disseminating RVR, but because this was linked with one for displaying other information, it was not installed until March 9. The new system operates as follows:—

To guard against a fall in visibility not being passed to radar talk-down a direct telephone link has been provided between the observer who measures RVR and the approach controller; this replaces the previous practice of passing information through the air controller. Indicators have been also installed at the "talk-down" controllers stations, eliminating the need for changes in RVR to be passed verbally.

To relieve the talk-down controller of the responsibility for deciding whether to interrupt a talk-down sequence in order to pass changes in runway visual range, he is now required to pass *without delay* any significant changes notified to him while the aircraft is on the final stage of the approach.

Subsequent to the accident, the first fire service vehicles arrived at the aircraft within nine minutes, but foam tenders and an ambulance became lost in the fog and reached the Viscount 30min later. Similarly, the water hydrants, 300yd from the aircraft, were not found until 1hr 10min after the accident. A MoA statement says that the following action has since been taken:—

To reduce the chances of appliances being delayed by fog from reaching an accident, a direct radio telephone link has been provided between MoA vehicles and the tower. Radar directions can now be passed direct to the drivers instead of via the fire service watch room. To enable firemen to find the hydrants quickly lines between the runway edge and the hydrant position are being marked on the ground.

*"*Civil Aircraft Accident. Report on the accident to Viscount 802 G-AOHU which occurred on January 7, 1960, at London Airport." HMSO, price 3s.*

One of South African Airways' three Boeing 707-320s, which are due to be officially inaugurated on the London - Johannesburg SAA/BOAC "Springbok" service next Sunday, October 2 (see story below)

SPRINGBOK 707s

THE *Springbok* service between Johannesburg and London was actually operated by SAA's Boeing 707s before the official inauguration on Sunday next, October 2. A 707 operated the scheduled service normally operated by a DC-7B on September 14, and passenger flights were made on September 21 and 28.

SAA's DC-7Bs will take over some domestic services (four times a week from Johannesburg to Cape Town as a mixed first-class/Skycoach aircraft) and will be retained on the fortnightly Wallaby service to Perth in Australia. There are also reports that SAA are going to Tel Aviv with the DC-7B. Certainly the airline will have plenty of surplus capacity from tomorrow, October 1, with seven DC-3s, five DC-4s, four Constellations and four DC-7Bs which have not been fully utilised. The bulk of domestic traffic is carried by the seven Viscount 813s and international traffic (from October 1) with Boeing 707s. SAA has two 707s for four services a week between Johannesburg and London, with a third for delivery in January, when services will doubtless be stepped up.

RATIONALIZATION REWARDED

THOSE who championed the cause of rationalization in Italian air transport must find well-deserved satisfaction in the 1959 report and accounts of their country's national carrier. Although at first sight a profit of £87,000 on revenues of £20 million may suggest scant cause for rejoicing, when seen against the massive losses incurred by Italian airlines in the past (£1 million in 1958), the latest results show remarkable improvement.

That this profit was obtained in the face of low average revenue rates (60 pence per l.t.m. as against 67 pence for BEA) and low load-factors (55 per cent compared with BEA's 68 per cent), was due to the admirably low cost-level of 34 pence per c.t.m. that Alitalia has now achieved. Undoubtedly, an important reason for this low level was that the bulk of the 1959 output of 145 million c.t.m. was produced by the Viscount and the DC-6B—possibly the two most efficient pre-jet transports. But of equal significance is the human factor: whereas Europe's airlines currently show a typical annual staff output of about 20,000 c.t.m. per employee, Alitalia's 4,700 employees last year averaged well over 30,000 c.t.m. each. Not only has stern budgetary pruning had a lot to do with this exceptionally economical use of staff, but the long-haul character of the airline—about one half of its traffic moves on intercontinental routes—also assists the company in obtaining a high level of output in relation to the work-force.

According to the report, the most successful long-haul routes were those to North America and to Africa. In contrast, services to Latin America, to the Middle East and to India tended to be unprofitable. Results for Alitalia's intra-European routes were mixed, with Spain, Switzerland and France doing well while Belgium, Germany and Austria were disappointing. The domestic network, despite a 25 per cent traffic expansion, continued to show a loss.

Alitalia have no intention of letting their meteoric growth of recent years slacken off, and are already in process of taking final delivery of an initial batch of four Conway DC-8s and four Caravelles. The full fleet of 12 Caravelles and eight DC-8s will be in operation early in 1962, by which time the company should have been operating within Air Union for nearly a year. The rewards of rationalization should then be abundantly clear to Alitalia's rivals.

TEAL AN ALL-NZ AIRLINE?

THE possibility that Pan American may obtain rights to operate across the Tasman Sea between Auckland and Sydney arises from negotiations now going on between the New Zealand and US civil aviation authorities. So far this route has been monopolized by TEAL, which is owned by Australia and New Zealand. New Zealand wants for TEAL a route from Auckland via Tahiti and Hawaii to San Francisco, and is said to be offering reciprocal rights to Pan American. TEAL also wants rights beyond San Francisco.

The future of TEAL, which New Zealand is reported to be envisaging as its international flag carrier, is now under review, and it is reported that New Zealand may be given the opportunity to buy out Australia's interest in the airline. If this occurred they would, it seems, be in the position of competing against PanAm's jets with Electras.

Meanwhile, the French also want trans-Tasman rights between Sydney and Auckland for TAI—presumably in exchange for rights previously given to TEAL through Tahiti to Hawaii and beyond to the US. It is said that New Zealand has conceded trans-Tasman rights to TAI, but it is not certain that the Australians would allow TAI's DC-8s to operate the service from Sydney—unless the French give Qantas traffic rights in Paris.

AIR COMMERCE . . .

AUSTRALIAN SUNBIRD

EARLIER this month TAA began to take over the Qantas services in Papua - New Guinea and with them six DC-3s and four Otters previously operated by the Australian international airline.

In the near future TAA hopes to extend its network to encompass more of the territory and the adjacent islands. These services would supplement those operated by DC-6Bs and Friendships on the trunk routes between the Australian mainland, Port Moresby and Lae. During the change-over period from Qantas to TAA, the timetable for internal Papua - New Guinea services has been retained and reservation facilities remain unaltered. But to emphasize that the services are under new management TAA has adopted for them the title Sunbird, because "we think it typifies the local climate and is the name of a small, brightly coloured bird found in the territory."

A NEW NAME IN IRELAND

ULSTER AIRLINES, a new Northern Irish independent, has applied to operate a scheduled service between Belfast (Nutt's Corner) and Enniskillen (St Angelo). If it is authorized this will be the first domestic service within the six north-eastern counties of Ireland—the Aer Lingus Dublin - Shannon service is, at present, the only domestic route operated within the Republic of Ireland.

LOCKHEED'S FREIGHTER PLANS

ACCORDING to an American source, Lockheed have discontinued work on the commercial version of the C-130B Hercules, following failure of a commercial customer to "definitize its contract for five as of July 31." The C-130B is the military development of the C-130A, being heavier and more powerful with Allison 501D-22s of 4,050 e.h.p.

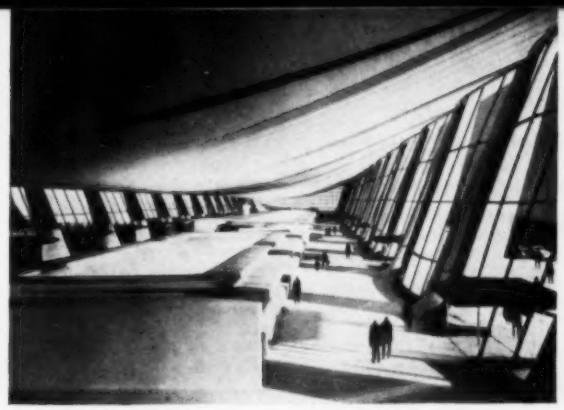
The Super Hercules (GL-207), which may be fitted with Rolls-Royce Tynes, remains in the project stage. There is also a turbofan swept-wing development, the GL-207-42, with JT3D-11s of 22,000lb thrust (*Flight*, June 10, page 809).

A SERVICE FROM LEEDS TO LONDON

AFTER a break of four years, BKS are to reintroduce on a regular basis a service from Leeds/Bradford airport at Yeadon to London. It will operate daily from October 3, except at weekends, leaving Yeadon at 0800hr and London Airport each evening at 1900hr.

The last venture by BKS on this route terminated at the end of summer 1956. Some seats have been available on the Leeds - London sector of the company's weekly service to Bilbao during this summer, but the present timetable, opening significantly at the start of the winter season, represents a determined effort to recapture business traffic on this route. If demand appears satisfactory a second service, with timings suitable for business visitors to Leeds/Bradford from London, may be opened later. The monthly return fare is £7 and journey time 1hr 20min.

The Irish Ferry Bristol 170 service between Liverpool and Dublin has been successful, carrying more than 2,000 cars since May. Extended first until the end of October, it will now be operated daily throughout the winter. The Edinburgh - Belfast service will also now operate all the year round.



Above, exterior and interior impressions of the FAA's new Dulles International Airport, Washington, which will be in operation next summer. On the left above is the rear—airfield—side of the 600ft-wide terminal building, showing the "mobile lounges" in position. A model of one of these huge vehicles is seen in the lower picture being inspected by Mr E. R. Quesada, head of the FAA; a note about it appears on this page

DANIEL IN THE LION'S DEN

LOFTLEIDIR have established a unique position in the world of air transport; using relatively uncompetitive aircraft, and backed by quite modest resources, they manage to prosper—without any form of goverment assistance or subsidy—on the most competitive route of all, the North Atlantic.

The explanation for their success is to be found wholly in their low cost level. Unfortunately no precise figures are available, but the accounts for 1959 that have just become available indicate that cost per c.t.m. lies nearer to 25d than to 30d. This allows Loftleidir to operate at fares which are well below the IATA economy class level—even in the winter—and to make substantial profits at a 70 per cent load factor.

Last year their four DC-4s clocked up over 14,000hr to achieve the remarkable annual utilization rate of over 3,000hr—almost ten hours a day. This was on a weekly schedule of four return flights in January-April, nine return flights in May-October, and five return flights during November and December. During the course of the year 35,500 passengers were carried, an increase of 33 per cent over 1958, and freight and mail amounted respectively to 315 and 32 tons.

If it were possible to devise a measure of staff productivity, then Loftleidir staff would certainly show up as well as their aircraft. Approximately £2 million worth of business was done with 263 employees (of which only 212 were full-time). In terms of output per employee, the company shows an annual figure approaching 100,000 c.t.m. This extraordinary figure—probably the world's highest—is certainly a measure of Loftleidir's efficiency; but it also reveals the absurdity of this commonly used index. If the airline decided to do its own engineering instead of letting it out to subcontractors, then the so-called productivity figure could well be cut by a third.

During 1960 Loftleidir's progress has continued unabated, passenger traffic over the first seven months of this year having risen by 22 per cent. This means that traffic should exceed 40,000 passengers this year unless a pilots' strike that has been brewing throughout the summer should lead to cuts in services. Freight and mail traffic have also been expanding rapidly, showing increases of 29 and 59 per cent respectively over last year. Fare reductions have played a part in this growth, as has the use of more modern aircraft. The bulk of Loftleidir's services this summer—five round flights per week out of eight—have been operated with two ex-PanAm DC-6Bs (a third is likely to be acquired shortly), while the remaining services are flown with two DC-4s, one of which is owned by the company, the other being chartered from the Norwegian independent Braathens.

MOBILE LOUNGING AT WASHINGTON

A SUPERFICIAL assessment of the "mobile lounge" system to be used at Washington's new Dulles airport might be that it appears ungainly and awkward. But the Federal Aviation Agency, which is responsible for the US capital's new airport, in fact appears to have found a neat solution to the problem of how to get passengers between the terminal and the aircraft.

Mr E. R. Quesada, head of the FAA, says he is "concerned with the tendency for airports to grow by the extension of finger systems." It causes, in his view, "tremendous inconvenience to the passenger," who has to walk long distances through the fingers, with an additional down-and-up distance exposed to wind, rain, noise and blast. The loading bridge system admittedly avoids the down-and-up phase; but the FAA is concerned also with the *operational* inconvenience of the finger system, which requires intricate aircraft taxying and precise positioning at the gate.

The mobile lounge system allows maximum operational flexibility by separating aircraft operational facilities and passenger-handling facilities. The FAA have had to reckon with the fact that by 1965 aircraft will have to be parked as far away as two or three miles from the terminal building.

The vehicle itself is large, accommodating up to 90 people, and weighing 76,000lb. It measures 54ft by 15ft, and is 17½ft high; one end links with the terminal building, the other mates with the doors of all four-engined aircraft in use or likely to be in use in the future. A folding ramp across which passengers walk on to the aeroplane is adjustable up and down, and it is spring loaded to ensure contact with the aircraft, even if this should move slightly. The interior is fully air conditioned, carpeted and generally comfortable, though no refreshment or lavatory facilities are contemplated. The vehicle can be driven from either end, and it is powered by two 190 h.p. engines each of which drives its own two wheels through a three-speed automatic transmission. A feeler probe helps the driver to position the lounge.

The $750,000 (£275,000) contract for the design and construction of the mobile lounge was awarded to the Chrysler Corporation of Michigan on a cost-plus-fixed fee basis. The Budd Company of Philadelphia is sub-contractor to Chrysler for body design and construction. Target date for completion of the prototype is spring 1961 and a fleet will be available for operation by the time Dulles international airport is opened in the middle of 1961. Twenty-four positions will be available initially; by 1975, when perhaps 10 million passengers will be handled, a fleet of 56 lounges will probably be needed.

AIRBORNE TUTOR

SCHOOLCHILDREN in the American mid-west will next year receive some of their educational broadcasts from two DC-6s which have been modified at the instigation of the Mid-West Council on Airborne Television Instruction. The aircraft will start a four-month demonstration from January 20 next year and will transmit three hours of programmes on four days a week. Two aircraft will circle at 23,000ft around Montpelier, Indiana, and will relay prepared tapes. Westinghouse are supplying the TV equipment and Douglas Aircraft the aerials.

STRICTLY FOR THE BIRDS

MINISTRY OF AVIATION civil aviation information circular No 94/1960, recently issued, warns that pilots should avoid flying in the vicinity of the nature reserve of the Severn Wildfowl Trust between the end of September and the beginning of April. The Reserve covers an area of about four miles radius centred on 54°44′30″N 02°25′00″W. If it is not possible to avoid the area, states the circular, it should be crossed above 4,000ft.

AIR COMMERCE . . .

SIR MATTHEW FOR THE ARB

IT is announced by the Air Registration Board that BOAC's new chairman, Sir Matthew Slattery, KBE, CB, DSC, FRAeS, RN(Retd), has been appointed a member of the Air Registration Board. He takes the place of Sir George Cribbett, former BOAC deputy chairman, who retired earlier in the year.

Sir Matthew was unanimously nominated by British operators and he joins Group 1 on the Council of the Board. The other serving members in this group are Lord Douglas of BEA, Mr Eric Rylands of Skyways, and Col R. L. Preston.

RED-TAPE MEASURES

THE Government intends, notwithstanding last week's collective declaration of dismay by the Airline Operators Committee representing the 40 airlines serving the UK, to press on with the introduction of questionnaire cards to be filled in by arriving and departing British and Commonwealth air passengers. Samples have been printed, as illustrated below.

An order is to be laid before Parliament by the Board of Trade under Section 10 of the Statistics of Trade Act, 1947, and the scheme is to be introduced on January 1—unless the order is annulled by Parliament. Any passenger who does not fill in his form would, according to the Act, be liable to a £20 fine, or two years in gaol *and* a £100 fine if he "knowingly or recklessly makes any statement which is false."

United Kingdom

AIR ARRIVAL CARD

Statistics of Trade Act, 1947

Passengers other than immigrants need only fill in Part I.

Immigrants are required to complete Parts I and II.

Passengers with children under 15 years in their care should also complete Part III overleaf.

PART I

One of the pair of proposed forms (see text). On the other side of the original is Part III, a questionnaire in respect of children under 15

The dismay of BOAC, BEA, the IATA independents and the foreign airlines concerned is hardly surprising. For years IATA's and ICAO's "facilitation" experts have been striving to slash government red tape; some governments have been slower than others to dispense with the countless forms that harass operators, passengers and shippers, but at least none—until now—has devised fresh frustration.

The difficulties of distributing and collecting the proposed forms, particularly in respect of departing passengers in the chaotic conditions of LAP North, are likely to be acute. There are to be two types of card, one for departures, the other for arrivals, and similar forms are to be filled in by sea passengers also, as a simplification of the existing system. Passengers to and from Europe, by sea and air, will be exempt.

The Ministry of Aviation seems to be an unwilling *entrepreneur* in the implementation of the scheme. The Board of Trade is probably involved only because the necessary legislation can conveniently be done in their name. Obviously there is much more than meets the eye here—something of greater political importance than the mere collection of traffic statistics. Could it be that the Government want to keep a check on the increasing numbers of coloured Commonwealth immigrants now entering the UK by air?

Footnote: A BOAC spokesman said last week:—

"We have protested to the Ministry of Aviation at the proposed introduction of these forms. However, if the Government has decided to proceed with the proposal, we will co-operate so far as we are able to do so without engaging extra staff or incurring other costs. We will undertake to have the arrival forms distributed on incoming aircraft, but with the best will in the world we have neither the staff nor the space at London Airport North to undertake the distribution of departure forms. We are therefore proposing that the procedure involved at departure should be the responsibility of the emigration authorities."

Silver City have brought into use this attractive new terminal at Manston Airport, Kent, to cope with their increasing volume of business there. The new building will also be used by passengers on the London - Paris "Silver Arrow" service operated in association with British and French Railways. A special feature is the method of lighting, which is by Lumenated Ceilings, which diffuses concealed light from the whole ceiling throughout the interior of the terminal

UP TO £500 FOR A LICENCE

IF a British airline wants to operate a scheduled air service from the UK to a point outside Europe, it will have to pay (1) £200 to make the application, (2) £500 for the licence if it is granted, and (3) £500 per year for as long as it holds the licence. This is evident from a table of charges just published by the Ministry listing the proposed fees payable in respect of the new air service licences. Other fees are as follows:—

For a service to a defined area in northern Europe, the proposed charge is £50 and the licence fee £80 a year; for a scheduled service to anywhere else in Europe or, roughly, the Mediterranean (the precise areas are again defined precisely in degrees and minutes of latitude and longitude) the operator will be liable for £100 for the application and £250 a year for the licence. For UK domestic services, the fees are respectively £25 and £40. Finally, for services originating outside the UK and destined for a point outside the UK, the fees are £200 and £500 for terminals more than 1,500 miles apart and £100 and £250 for services less than 1,500 miles apart.

Fees for inclusive tours and group charters will cost £10 to apply for, and £10 a year for the licence; Class B and Class E charters (see *Flight*, July 29, page 164, for the definition of the various classes) the fees are respectively £20 and £60. A Class C charter will cost £2 to apply for and there will be no charge for the licence.

Assuming that fees should be payable at all—an assumption which has been strongly contested behind the scenes by more than one British operator—the proposed scale is open to criticism on the score that fees are not related to the value of the service to be operated. For instance, an independent operating a weekly service from, say, a provincial UK airport to a point in north Europe will have to pay £80 a year for his licence—exactly the same fee as another operator who might be flying a dozen-times-daily service from London to the same point. In other words, the fees are not related to the traffic-value of the licence. The scale will be in the form of a flat rate regardless of the amount of business generated by the service concerned. The independents, as spoken for by BIATA, feel "strongly opposed" to this flat-rate method, and are suggesting that fees should be related to the value of the service.

Some considerable sums will have to be found by BOAC and BEA in respect of licences for the routes which they already operate. Even so, £10 a time for inclusive tours and group charters—of which a very large number are operated every year—will also amount to no mean sum for the independents.

TALKING FARES AT CANNES

TOMORROW, October 1, is the date on which the very-low-fare winter excursion fares will become available on the North Atlantic. Available until March 31, and valid for 17 days, a ticket to New York will cost £125 by jet or £114 by propeller aircraft (a propeller differential of about 8½ per cent).

This major reduction brings the air fare lower than the lowest sea fare, and it is equivalent to a passenger-mile rate of about 4d compared with about 6d for economy class. Equivalent economy-class fares, which came into effect on July 1 last, are £174 jet and £161 propeller. The lowest return sea fare is £116.

It is therefore unlikely, pending airline experience of response to these new promotional fares, that the IATA traffic conference which has been in session at Cannes since September 19 will introduce any new North Atlantic fares. But South America is

likely to be a contentious issue, since the fares war is still raging here, with some South American operators to Europe and North America reportedly undercutting IATA rates by up to 40 per cent.

The conference is expected to last for up to five weeks, but it should be less turbulent than the Paris and Honolulu meetings which established two important principles: a fare structure comprising two basic classes of service, and fares based on jets with propeller aircraft being granted advantages in either price or service.

Following the resignation last July of Mr John Brancker, IATA's Traffic Director, Sir William Hildred, the Association's Director General, is for the first time fulfilling the role of traffic director at the conference.

BALPA AND CAPT KEY

WRITING in *The Log*, the journal of the British Air Line Pilots' Association, Capt S. J. L. Key of BEA criticizes BALPA for questioning the motives of the German Commission that inquired into the Munich accident in February 1958. He describes BALPA's action as "most unworthy" and considers that "it verges on a gross breach of privilege."

Capt Key was a representative of BALPA at the German inquiry, and he has subsequently resigned from membership of the Association. It is his "firm opinion" that BALPA has not given the evidence objective and impartial study and he considers that this is incompatible with BALPA's "claim to professional status."

In their report on the accident submitted last April, BALPA said that they regarded the German findings as being based on a number of assumptions which they considered inaccurate and contentious. Capt Key says: "I see no reason to assume that the German Commission was concerned with any other objective than determining the real cause of the accident." He does not think that anyone would contend that the German report cannot be criticized. But he thinks there is "a vast difference between constructive criticism and a deliberate attempt to discredit those who are charged with the duty of investigating a disastrous accident involving loss of lives."

He goes on: "To attempt to discredit the German report by the publication of a report based on selected evidence, some of which is directly contradicted by the evidence given to the German commission by the principal witness, is not an action which can be condoned by those who feel that the pilots' Association should retain a serious place in the field of accident study.

"If it is thought impossible to reconcile the trade union function of the Association with the wider requirement to be associated in the investigation of accidents for the good of aviation in general, and the safety of pilots in particular, the attempt to do so should be abandoned."

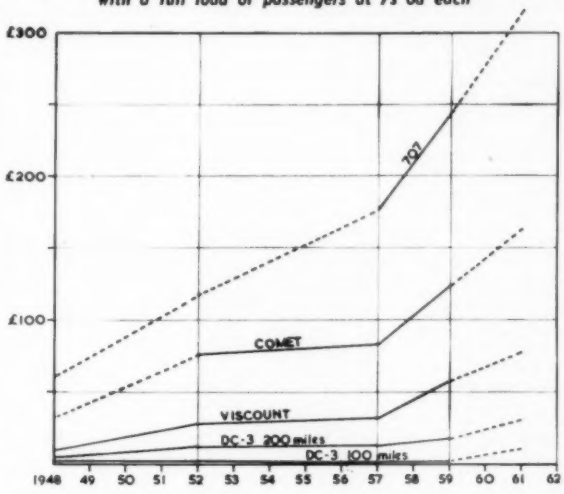
In its editorial *The Log* says that the committee producing the BALPA report "could not have been more objective or open-minded." The fact that evidence had been selected from the résumé of the German report did not mean "that all the other mass of evidence was not considered." *The Log* adds that "It will be very interesting" to read the findings of the Fay Commission at present reconsidering the accident, including evidence of the surviving captain, Capt James Thain.

UP GO THE FEES

NOT only does the Government propose to introduce a passenger-service charge of 3s 6d for UK domestic flights (*Flight*, September 16, page 479); it is also reportedly planning to increase the 7s 6d international passenger-service charge. It is also likely that landing fees will be increased, by considerable amounts, early in the New Year. The precise increases proposed are not yet known; but the graph below indicates the way in which fees have risen over the past decade or more, with projections into the future which, though not all straight-line extrapolations (an average percentage for all five types based on past trends has been applied), are believed to give an indication of the likely increases.

A glance back through the records to 1922, when fees were first introduced, shows that a multi-engined type in those days had to pay a mere fifteen bob by way of a landing fee. Today a 707 can cost as much as £250 including the passenger-service charge.

UK government revenues from typical aircraft since 1948 (see text). Assumptions: DC-3s operated in the UK; Viscount, Comet and 707 landing from Rome, Singapore and New York respectively and departing with a full load of passengers at 7s 6d each



BREVITIES

Avro are going ahead with sixty 748s, a doubling of the previous production programme which called for the building of thirty. This news was given last week by Mr J. A. R. Kay, Avro's managing director.

Mr E. W. Metcalfe, senior operations representative in Europe for Aerolineas Argentinas, has returned to Buenos Aires to take up a new appointment as the airline's director of operations.

The weekly Qantas London - Singapore - Sydney cargo service, which was started last November, has been so full that a second weekly operation, via Hong Kong, is to be introduced next month. It will be operated in association with BOAC.

The Australian Department of Civil Aviation has "examined the cooling test data for the Piaggio P.166 and finds that there are sufficient margins in the cooling to permit operations in temperatures of ISA plus 25°C without the need for further testing and the Department will clear this aircraft for operations under these conditions." Some 22 P.166s have now been sold.

In evidence to the CAB, United Air Lines make it clear that they will not proceed with the proposed merger with Capital if, as is being suggested by protesting US carriers, major parts of Capital's route system are removed. Also, in evidence to the CAB, Vickers-Armstrongs (Aircraft) say that their foreclosure suit against Capital will be pressed if the United-Capital merger falls through. United have asked the CAB for a decision by February 1.

Following the recent announcement by Aer Lingus that they are to re-introduce their Dublin - Belfast service in December, BKS state that a Belfast - Dublin route is to be inaugurated in October with Ambassadors. Though BKS has operated Newcastle - Belfast and Newcastle - Dublin Ambassador services, hitherto no local traffic has been carried between the two Irish capitals. When Cork Airport opens next May, BKS will operate from Newcastle and Leeds/Bradford to Cork as well as to Belfast and Dublin.

"Bigger, bolder and easier to read and understand" is BOAC's description of a "completely replanned" new timetable just issued. It has an entirely new form of presentation.

As we go to press it is reported that an Austrian Airlines' Viscount on a flight from Vienna crashed near Moscow on September 26. Of the 31 passengers and six crew on board thirty were killed.

Just published is the third edition of the ABC-series booklet on London Airport. Attractively illustrated, it describes the facilities and the aircraft that use the airport. Published by Ian Allan, it is available from Craven House, Hampton Court, Surrey, price 2s 6d.

The "special task force" recently formed by IATA to speed up the handling of passengers and cargo at airports, and entitled Ground Handling Advisory Group, will have as its chairman Mr E. P. Whitfield, BEA's traffic director. Vice-chairman is Mr J. A. Clay of TWA, and secretary is Mr V. H. King of IATA's technical liaison office in London.

The talks between the Japanese and British civil aviation authorities finished in London on September 22 with "full agreement on all matters discussed." The talks included JAL's plans to fly from Tokyo to London over the Pole and via India, and BOAC's plans to expand round-the-world services via the Pacific and the eastern routes.

From October 20 BOAC 707s are to serve San Francisco. There will be two flights a week and there will be an additional once-weekly Britannia service between London and San Francisco. Britannias will continue to operate for the time being on to Tokyo and Hong Kong, a twice-weekly service. However, following the UK-Japanese air agreement talks in London (see brevity above) 707s will replace Britannias on the San Francisco - Tokyo - Hong Kong route on December 8—thus inaugurating BOAC's round-the-world service by pure jet, the 707s connecting in Hong Kong and Tokyo with "eastabout" Comet 4s from London.

SERVICE AVIATION

Air Force, Naval and Army Flying News

Director of Movements

HAVING been a Deputy Director of Movements at Air Ministry since January this year, Gp Capt S. G. Walker is to become Director of Movements on October 12, with the acting rank of air commodore. Gp Capt Walker is an equipment officer; he served during the war with the British Air Staff in Washington (1941-43), then at Allied Expeditionary Air Force headquarters. He was made an OBE in 1945.

RCAF's Third Victory

FOR the third year in succession the RCAF team won the Guynemer Trophy in the annual AIRCENT air firing competition, held at Cazaux, the French Air Force base near Arcachon, from September 5 to 16. The RCAF victory was briefly recorded in *Flight* last week (page 493), as was the fact that the RAF Germany team came second: respective scores were 1,357.7 and 1,257.8 points. A Fighter Command team came next with 1,240.5 points, the RAF thus securing second and third places. Other contestants were teams from the French, Danish, Belgian and Netherlands Air Forces.

The Guynemer Trophy was presented on September 17 to Flt Lt Richard Spencer, captain of the RCAF team, by General Maurice Challe, Commander of the NATO Allied Forces in Central Europe; and a cup for the runners-up, donated by USAFE, was presented to Flt Lt R. D. Stone, who captained the RAF Germany team.

AVM V. E. Hancock, CB, CBE, DFC, whose appointment as Chief of Air Staff-designate of the RAAF was referred to on this page last week

FALLEX 60

SQUADRONS from both Coastal and Bomber Commands have been taking part in this year's big NATO exercise, FALLEX 60, which started on Tuesday last week and finishes tomorrow (October 1). In addition an RCAF squadron of Argus aircraft, No 405, has been participating for the first time. Almost 400 aircraft have been engaged, both land-based and carrier borne, the Royal Navy carriers *Ark Royal* and *Hermes* operating with the USS *Saratoga*, *Shangri-La* and *Essex* among the total of 146 warships involved.

The code-name FALLEX 60 comprehends six different NATO exercises which have been taking place almost simultaneously: Blue Shield, First Watch/Second Watch (anti-submarine and shipping protection operations), Sword Thrust (in which Bomber Command aircraft have mounted sorties), Ballast One and Coffer Dam. The senior RAF officer on the directing staff of FALLEX 60 has been Air Marshal Sir Edward Chilton, AOC-in-C Coastal Command, in his NATO capacity as Commander Maritime Air Eastern Atlantic. About thirty sorties were carried out by Bomber Command in Sword Thrust, both Canberras and V-bombers participating.

General Maurice Challe, Commander of NATO's Allied Forces in Central Europe, presenting the Guynemer Trophy to Flt Lt Richard Spencer, captain of the winning RCAF team, at the conclusion of the AIRCENT air firing competition (see item in Col 1). Looking on is Maj-Gen M. Donnet from AIRCENT, chairman of the competition organising committee

Shephard Essay Prizewinners

THIS year's Gordon Shephard Memorial Prize essay competition has been won by Gp Capt Neil Cameron, who was until recently personal staff officer to the CAS and is shortly to assume command of RAF Abingdon. Entrants were asked to discuss the need for Britain to possess a valid deterrent force, and for his 4,000-word essay Gp Capt Cameron has won 50 guineas. The second prize (30 guineas) went to Air Cdre Wilfred Carter, who was fourth last year and won the competition in 1955, 1956 and 1957; and the third prizewinner was Gp Capt M. H. Gardham, who won last year's competition.

Owner-riders Wanted

IN view of its successes during the past few years, the RAF Equitation Association announcement that its show-jumping activities are to be wound up—at any rate temporarily—is a sad one. This decision has been taken ("very reluctantly") because owing to the retirement of AVM Sir Laurence Sinclair and the fact that neither Air Cdre J. N. W. Farmer nor Sqn Off Peggy Potter will be available next year, there are not enough competent riders to enable the team to continue. The Association's four horses—Polonaise, Roly, Gladys and Vulcan—were sold at Ascot last month.

If, however, riders can be found with their own mounts to carry on where the present members have left off—and the Association hopes that this will be the case—they are promised the same encouragement that the RAF Sports Board has given over the past five years.

IN BRIEF

The RAF Reserves Club is holding its annual general meeting on October 3 at the club house, 14 South Street, London W1, at 6.30 p.m.

Two more RAF airfields in the Mediterranean area—Luqa (Malta) and El Adem (Libya)—are shortly being equipped to lay foam carpets, for use in the event of emergency landings owing to undercarriage failure.

No 2 ADU, the wartime Middle East ferry unit, is holding its 1960 reunion dinner at the RAF Reserves Club, 14 South Street, Park Lane, London W1, on Saturday, October 15, at 7 for 7.30 p.m. Further details from W. R. Miller, 11 Wilcot Avenue, Oxhey, Watford, Herts.

Four RAAF aircraft—three Canberras and a Hercules—are to represent the Australian Armed Services at Nigerian independence ceremonies this weekend. (Details of RAF participation were given on this page last week). The RAAF machines are making a round-the-world flight, from west to east, returning from Lagos to Australia across the Indian Ocean.

Vale to Treble One: this picture, taken near Biggin Hill during the squadron's last Battle of Britain display appearance there as the Fighter Command aerobatic team, appropriately conveys in an autumnal setting the verve and polish of their performances during the last four years